WL-TR-94-2025

DEVELOPMENT OF A BIPOLAR LEAD/ACID BATTERY FOR THE MORE ELECTRIC AIRCRAFT

AD-A284 050

A LABORATORY

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MARCH 1994

INTERIM REPORT FOR 09/01/91-03/01/93

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	<u>-</u>		ric composite substrate
for use in a true big	oolar lead acid battery	. The contract	goals for the development
of the substrate mate	erial are as follows:		
Resistivity: ≤ 2 ohm-			
Thickness: ≤ 0.064	<u>cm</u>		
Weight: ≤ 150 mg Area: ≥ 400 cm	3/ cm ⁻		
Area: ≥ 400 cm	u .		
This report presents	information towards ac	chieving those go	als.
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WPAFB INTERIM TECHNOLOGY REPORT BIPOLAR BATTERY DEVELOPMENT SEPTEMBER 1991- MARCH 1993

1. INTRODUCTION:

This report summarizes the development work completed by Johnson Controls Battery Group Inc., JCBGI, under U.S. Air Force Contract F33615-91-C-2142, Data Item #A006, for the time period of September 1991 through March 1993.

The focus of the work was on the development of a filled polymeric composite substrate for use in a true bipolar lead/acid battery. The role of the electrode in a bipolar design is paramount. The essential function of the substrate is to provide electronic conduction between the positive and negative active materials without permitting ionic conduction which would short out the cell. The substrate requirements are summarized below:

- 1. Electrical conductivity
- 2. Chemical insolubility in sulfuric acid in the potential windows of both electrodes
- 3. High oxygen and hydrogen overpotentials in sulfuric acid
- 4. Inertness to the electrode reactions
- 5. Ionically non-porous
- 6. Manufacturable

The contract goals for the development of the substrate material are found below.

Resistivity $\leq 2 \Omega$ -cm
Thickness 0.064 cm
Weight $\leq 150 \text{ mg/cm}^2$ Area $\geq 400 \text{ cm}^2$

JCBGI has focussed its development efforts on attaining or exceeding each of these goals. The original program schedule can be found in Figure 1, and the present program schedule can be found in Figure 2.

JCBGI has extensive experience in testing and developing potential conductive fillers for bipolar lead acid batteries. To date over 100 candidates have been screened and only a few have been identified as a possible filler materials. JCBGI concentrated on developing the most promising of these fillers for use in this program. A systematic approach was used to first, prove the stability of the conductive filler, and second, develop the processing and fabrication techniques needed to produce highly conductive, thin, non-porous substrates.

The stability of the conductive filler is tested through a series of tests developed at JCBGI. The most critical of which is exposing a compounded substrate to a constant potential of 1.5 volts for a period of time varying from 4 to 34 days. This method tests both the stability of the conductive filler at positive overpotentials and the porosity of the substrate.

After improving the compounding techniques to consistently produce non-porous parts, proof of concept testing was conducted on low voltage batteries. Four volt batteries were built to prove the viability of the substrate in an actual battery and to address the next major development issue-positive active material adhesion.

The above development issues will be discussed in further detail in the upcoming sections.

2. PERFORMANCE PROJECTIONS:

A set of preliminary performance requirements for the More Electric Aircraft (MEA) energy source were given to JCBGI, by Richard Flake of WPAFB, during the program kickoff meeting on December 12, 1991. The energy source requirements are summarized below:

Main Engine Starting: 150 kW, 30 sec

Ground Power: 25-75 kW, 30-45 min

Emergency Power: 75 kW, 10 min
APU Starting: 5-10 kW, 15 sec

Hybrid Emergency: 50-75 kW, 60 sec

Temperature Range: -65F to 120F

Voltage Window: 270 Minimum; 330 Maximum

Given the above performance requirements, JCBGI using their proprietary lead/acid battery mathematical model (LABMM), designed four different bipolar batteries for both 5-and 10- year time frames. In designing the battery system for the 5-year time frame, JCBGI assumed that the program goals for the substrate development were reached and used conventional active materials. The 10-year battery systems were modelled assuming a thinner more conductive substrate and improved active materials. The results of the modelling can be found in Figures 3 and 4. The size of the battery can change dramatically depending upon the application ranging from as small as 0.18 ft³, 33 pounds to as large as 8.13 ft³, 1349 pounds.

3. CONDUCTIVE FILLER DEVELOPMENT:

Building on the work performed in JCBGI's first bipolar lead/acid program with WPAFB, conductive filler development was continued in the same promising areas. Towards the end of the initial program JCBGI was having some success using one type of conductive filler that showed stability in the battery environment. Also, other conductive fillers were investigated including SiC, and Ceramic plaques and coated fibers using the same filler chemistry. JCBGI renewed working relationships with two suppliers of Conduflow, and found different companies that were interested in developing coated glass fibers with Conduflow and ceramic plaques with Conduflow.

The investigation into coated glass fibers by Photon Energy Systems was not successful. They made four different attempts on making fiber, but each of the trials could not be used because of a number of problems. First, the glass used would not withstand the acid environment. Second, the material was not uniform and was highly resistive. Third, the adhesion of the coating to the glass was virtually nonexistent which made handling next to impossible and completely eliminated any chance of compounding the material into plastic. Finally, they could only make the material on long strands of glass, 2-6", which could not be used for our application. After the fourth shipment of subpar material, which they said would be the best that they could make, activity in this area was discontinued.

After the attempt at glass fibers was not successful, the focus of development efforts was placed on Conduflow powder. Two companies were contacted and samples obtained from each. The samples were extremely similar in particle size and appearance but the material from Magnesium Elektron Inc. (MEI) was much more conductive than the Crystal Research Inc. (CRI) material. Leach tests of both materials proved that they were stable in

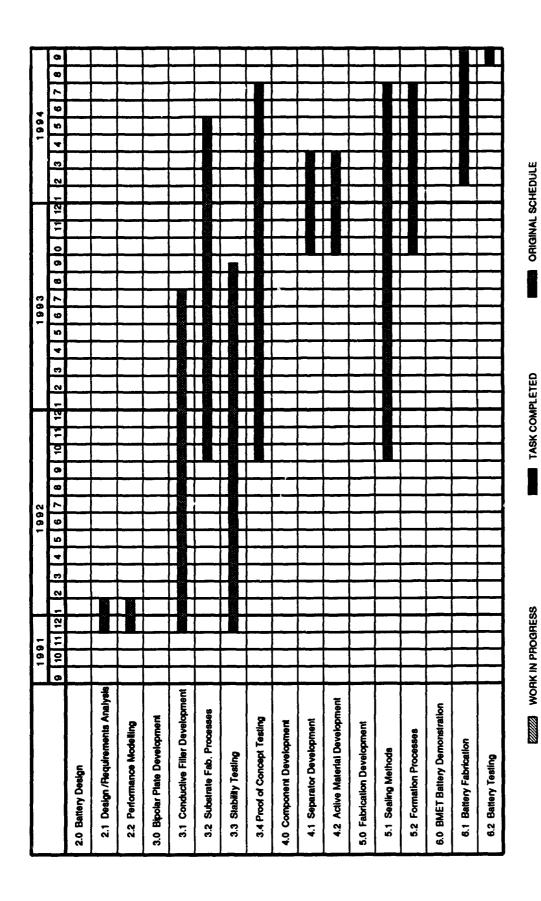


Figure 1 Original BMET Program Schedule

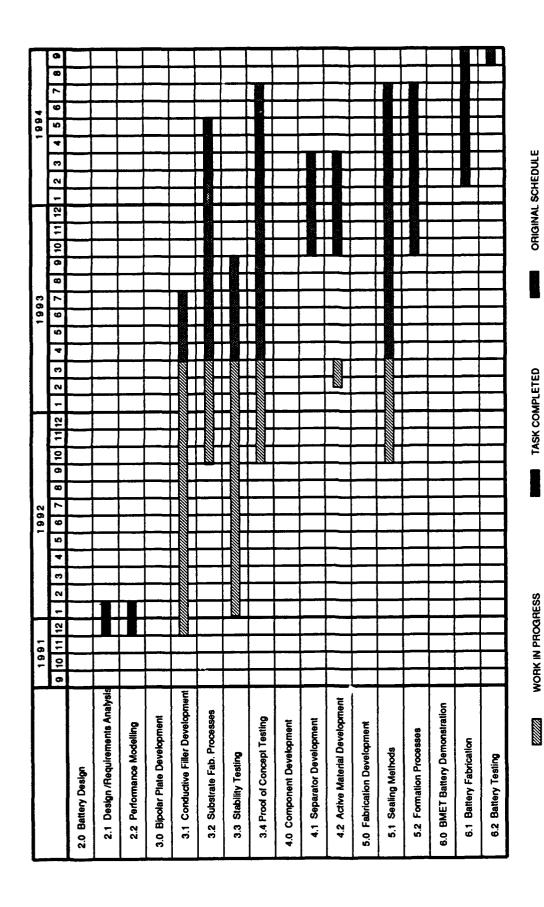


Figure 2

BMET Program Schedule

REQUIREMENTS MET	BATTERY DIMENSIONS	BATTERY VOLUME	BATTERY WEIGHT	W/kg	W/cm3	W-hr/kg	W- hr/cm3
Main Engine Starting APU Starting Hybrid Emergency	17.6"x15.5"x15.5"	2.45 ft3	450 lbs	747.9	2.2	12.25	0.036
Main Engine Starting Ground Power Emergency Power APU Starting Hybrid Emergency							
Scenario 1 30 minute ground power capacity	27.4"x19.7"x19.7"	6.15 ft3	1000 lbs	62.2	0.16	31.08	0.081
Scenario 2 45 minute ground power capacity	36.2"×19.7"×19.7"	8.13 ft3	1349 lbs	46.1	0.12	34.56	0.092
APU Starting	16.5"x4.33"x4.33"	0.18 ft3	33 lbs	705.0	2.1	11.75	0.036

Figure 3
BMET PERFORMANCE REQUIREMENTS
BIPOLAR BATTERY SPECIFICATIONS
Near Term Projections (within 5 years)
330 Volt Battery Systems

REQUIREMENTS	BATTERY DIMENSIONS	BATTERY	BATTERY WEIGHT	W/kg	W/cm3	W-hr/kg	W. hr/cm3
Main Engine Starting APU Starting Hybrid Emergency	14.4"x15.5"x15.5"	2.00 ft3	sql 68£	895.3	2.8	14.17	0.044
Main Engine Starting Ground Power Emergency Power APU Starting Hybrid Emergency							
Scenario 1 30 minute ground	21.6"x19.7"x19.7"	4.85 ft3	864 lbs	72.0	0.21	35.97	0.103
Scenario 2 45 minute ground power capacity	29.9"x19.7"x19.7"	6.72 ft3	1235 lbs	50.6	0.15	37.77	0.111
APU Starting	15.2"x4.33"x4.33"	0.16 ft3	31 lbs	772.0	2.3	12.87	0.041

Figure 4
BMET PERFORMANCE REQUIREMENTS
BIPOLAR BATTERY SPECIFICATIONS
Far Term Projections (10 years)
330 Volt Battery Systems

an acid environment, but determining their stability at the positive potential of a lead acid system was more difficult. The one problem with Conduflow was that it is not stable at the negative potentials of the battery. To be able to use Conduflow as a substrate material a multi layer system would have to be used. Drawing on JCBGI's experience from the initial WPAFB contract, C-black was determined to be the ideal second half of the substrate. C-black is highly conductive, lightweight, readily available, and stable at the negative potentials. However, C-black is not stable at positive potentials, making it an ideal complement to Conduflow. During the first contract much effort was made in developing the C-black material for use as the bipolar substrate before it was proved to be unstable at positive overpotentials. Because the development work was virtually completed for the C-black substrate, efforts were concentrated on proving the stability of Conduflow. The evolution of the substrate into a two piece laminate causes the interface between the halves to become a development issue. The manufacturing developments will be discussed later.

The attempt by Materials and Electrochemical Research Inc.(MER) to produce a dense plaque of Conduflow was also not successful. The plaque was found to be dissolve and become non conductive when placed in contact with sulfuric acid. After the initial trial no further attempts were made.

At the same time that efforts were shifted towards powder Conduflow, a concurrent effort was made to develop a SiC material that could be used as a conductive filler. Qualification screening at JCBGI showed that SiC was a possible material that would be stable at both the positive and negative potentials of a battery. Samples of SiC were received from MER and found to be to resistive to use as a conductive filler. Because of this, JCBGI's efforts became even more focussed on the promising Conduflow compound.

Initial compounding trials had yielded substrates that were tested to be non-porous and stable during 4- and 5-day stability testing. Through improvements in compounding procedures, which will be discussed later, consistently stable substrates were produced. After extensive testing it was concluded that Conduflow was indeed a viable conductive filler for a bipolar lead/acid battery. Development on different fillers were discontinued to concentrate on optimizing the Conduflow and the compounding parameters needed to produce working bipolar electrodes.

The Conduflow received from MEI proved to be consistently better than any other material tested. MEI had also supplied all of the material to JCBGI, worth over \$110,000, at no cost over the first 18 months of this contract. Because of the potential for this product, MEI and JCBGI entered into a joint effort for the development of Conduflow. MEI would

be responsible for developing the techniques of producing and improving the material, while JCBGI would test and qualify it. MEI would also lend their compounding expertise to the development effort.

The first area to be addressed in the development of Condustow was the particle size. It was thought that smaller particle size would eliminate the chance for porosity by being more easily wetted by the plastic resin. Initial trials using very fine particle size (< 1 micron) material yielded interesting results. The material was not as conductive as thought and also displayed more porosity than previous trials. After discussion with MEI and their compounding consultants, it was determined that the ultra fine particle size caused more problems than it solved. The small particle size lead to many more interfaces between the plastic and Conduflow which lead to higher porosity. The small particle size also caused the increase in resistance of the part. Since the conductivity of the material is dependent upon particle to particle contact, having uniform, ultra-fine particles make it more difficult to have a chain of contact throughout the thickness of the material. In fact, after further investigation the optimized particle size may be in the 10-20 micron size. Presently the particle size used is 3-5 microns, which is a result of the type of manufacturing method used. An entirely different method of production would be needed to produce material with larger particle size. After discussion with MEI, it was decided because of the timeframe of this contract, investigation into larger particle size Conduflow would not be feasible. Efforts would be better spent on optimizing the present form of Conduflow and compounding parameters.

4. FABRICATION PROCESSING TECHNIQUES:

With the focus of this contract on producing a polymer based bipolar substrate, JCBGI again moved forward from were the initial contract with WPAFB left off. Resins investigated during the first 18 months of this contract were LDPE, LLDPE, HDPE, Kynar, and PTFE. In the past all of these materials were compounded by hand in small batches using a mortar and pestle. This process was very limited in batch size and caused a large degree of variability from trial to trial. To eliminate these problems, JCBGI had proposed to use contract funding to purchase a Brabender type of mechanical mixer. Prior to beginning the contract, another group in JCI had purchased a similar machine. Because of the high loading levels needed (75-85% by weight) to make the material conductive enough, special equipment is needed to compound the material. The Brabender mixer was proposed to do this compounding. However, initial trials with the mixer showed that it would not

work on loading levels higher than 70%. Because of this, the Brabender mixer was never purchased and JCBGI began looking for different methods to compound the material. It was recommended to JCBGI that the best equipment for JCBGI to use would be a twin screw extruder.

Prior to purchasing a twin screw extruder, JCBGI had material compounded by two different vendors using similar equipment to verify that it would work at the loading levels needed. Two trails were run by Dr. John Muzzy, of Georgia Tech University, and MEI to determine if a twin screw extruder would work for our application. The success of the trials convinced JCBGI to purchase an extruder instead of the Brabender mixer. The unit was ordered in December of 1991, and was ready to run at JCBGI in late March of 1993.

It was thought at the beginning of the contract that the cause of the porosity problems in the substrates was caused by trapped gases during compression molding of the material into sheets. To eliminate the trapped gas, JCBGI and a local vendor, Molded Rubber and Plastics, designed a vacuum compression mold. In theory, by compression molding under a vacuum, any trapped gas in the material would be removed and result in a porous free part. After many different trials, stability testing showed that the parts made with the vacuum mold were not any better than parts in the conventional manner. Because of the cost of the process, \$65-\$75 per 12" x 12" part, and the large amount of material needed per trial, 10+ pounds, work in this area was discontinued.

Because of the success late in the initial program using LDPE as the base resin, JCBGI began its development using the same resin. The plastic, called Microthene, is purchased from Quantum Chemical Corp. in powder form. Using a powder form of the plastic results in a much more uniform dispersion of the filler material and helps eliminate porosity. The conductive filler and the plastic are dry mixed prior to melt blending. The material is then compression molded, laminated to the C-black material, and cut to size for testing.

JCBGI's approach in developing processing parameters for a this contract were using one resin, LDPE, to first prove the stability of the conductive filler, second to optimize part conductivity and eliminate part porosity, and third to reduce part thickness from around 0.070" to the contract goal of 0.025". To prove the stability of the filler, test parts were hand compounded at lower loading levels 80-82.5% by weight, and compression molded to a thickness of 0.070" and stability tested. After a series of successful tests, no change in resistivity after 4-34 days while maintaining a positive potential of 1.5 volts, the emphasis changed towards making the parts thinner, and more conductive.

Because the properties of the filler dictate a loading level of 80-85% by weight is needed to produce part conductivity high enough for use in a battery, JCBGI began investigating additives that would improve the physical properties of the substrate. MEI has extensive experience with producing conductive materials and suggested the following additives which could improve part conductivity, reduce porosity, and/or improve manufacturing- coupling agents, paraffin oil, stearic acid, ethylene vinyl acetate, and furned silica. After investigating all of these additives it was found that only coupling agents offered the only real advantage. The others while improving part conductivity caused additional problems with part porosity.

Since initial efforts with coupling agents were so promising, a series of trials were conducted to optimize the loading level and addition method of the material. Two different coupling agents were attempted per the advice of Kenrich Chemical Inc.. Of the two materials, one was clearly better at all loading levels. The coupling agents are used in small quantities, 0.01-1.00% by weight, of the filler. They are designed to bond between the filler and the base resin. The particular material used, LICA 38, is fumed silica which has been treated with the coupling agent. The coupling agent improved part conductivity and reduced part porosity at levels between 0.35%-1.00%. At levels higher than 1.00%, the additional material did not offer any improvement over the 1.00% level. It was also found that the order of addition was critical to the performance of the material. It was much more effective to blend the coupling agent with the conductive filler prior to adding the resin.

All of the development work was done using the powder form of the LDPE. This material had given JCBGI the best results to date. At the same time, other base resins were evaluated but none were found to have all the manufacturing advantages of LDPE. Recently, JCBGI has also been investigating HDPE which would give the substrate more high temperatures capabilities and a more rigid structure. Depending upon the application, the resin with the best properties can be used.

JCBGI also looked at using PTFE as a base resin. When loaded at 70-75%, the material was highly conductive, 1 Ω-cm, but was also highly porous. To combat the porosity, resin impregnation was attempted. The material was treated by Imprex Inc., with a polycarbonate based liquid resin under a vacuum. It was thought that the resin impregnation would remove the porosity while not hindering the conductivity. It did neither. The parts remained porous and became more resistive after the resin treatment. The activity as well as PTFE development was stopped.

Another resin investigated was Kynar. The material showed initial promise during hand compounding trials as producing conductive and non-porous material. However, the high temperatures needed to mold and compound material (375C) caused problems with the Conductive. JCBGI attempted to use blends of LDPE and Kynar which resulted in conductive but highly porous material. Because of the problems with Kynar and the promise of LDPE, development in this area was discontinued.

The development efforts for the C-black part of the substrate were much easier because of the vast experience JCBGI has using C-black for the Zn/Br_2 battery development program. JCBGI had screened several different types of C-black before choosing a Ketjenblack material, EC600JD, from Azko Chemical. After several iterations, the loading level of C-black in the LDPE was found to be 19% by weight. This afforded parts with conductivity of 1-1.6 Ω -cm and enough flexibility to be used as a bipolar substrate.

The fact that Conduflow is not stable at negative potentials meant that a laminate system would have to be used to protect it. This lead to development of the interface between the Conduflow substrate and the C-black substrate. Initial trials of compression molding the two halves together resulted in a part with higher resistivity than than the sum of the pieces. This was caused by the "skins" which are formed on the surfaces of each of the flat sheets during compression molding. Two different methods were attempted to remove the effect of laminating the "skins" together. The first was to add C-black to the interface prior to compression molding the two pieces together. This proved to be effective but was rather difficult to apply a uniform coating of the C-black to the interface. The second method attempted was to remove the skins on the interface by using sand paper. This worked better than the C-black addition and was much easier to use. Sanding the faces of the sheet stock prior to lamination resulted in a 50-75% reduction in part resistivity and no effect on part stability.

5. STABILITY TESTING:

A diagram of the stability test fixture can be found in Figure 5. A summary of all stability tests run can be found in Figure 6. Figure 7 is a graph of a typical stability test.

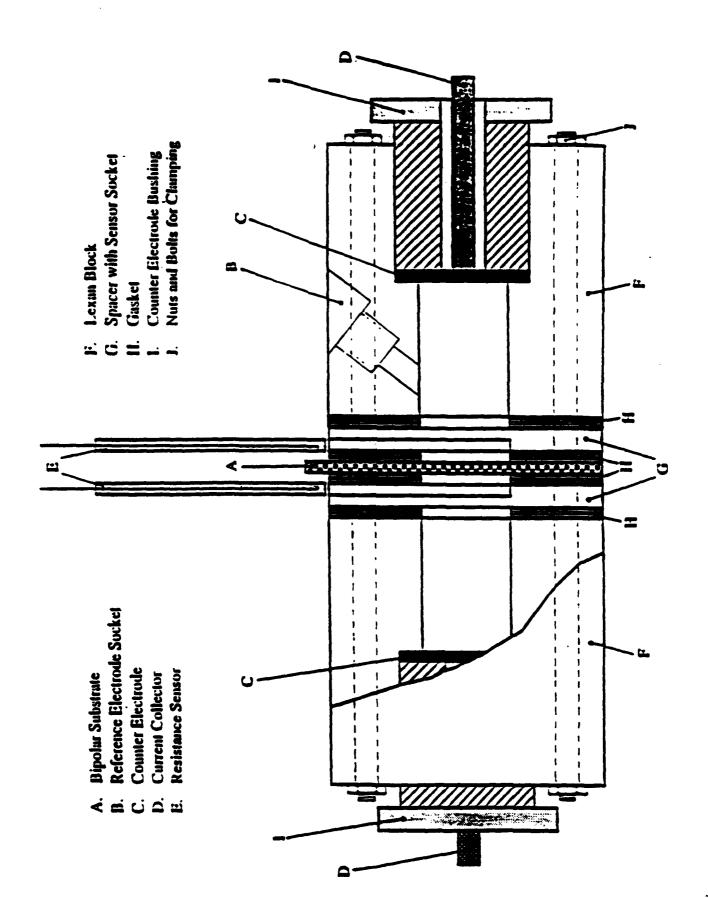


Figure 5 Stability Fest Fixture

Column		21-ocr-1992			STABILITY	TESTING				
For Local State Local Marketo BSS GCZIN C.126 C.126 C.126 C.126 C.126 C.127	- 1	DATE	1	RESISTANCE (OHK) BEFORE	THICKNESS (INCH) BEPORE	NESISTIVITY (OMI-CH) BEFORE	RESISTANCE (ORN) AFTER	THICORESS (THCS) ATTER	MESISTIVITY (OMF-CN) AFTER	
### LAD DOOK WINDOWN D 151 OCTH 0 6.50 0 10.25 9.321 1.000 0 1.00 1.000	1	4/2/92 RPEL LAB BOOK PG.103	LAMINATED 85% GC23W W/O CAPON L/12M 15% HGCHOTHENE 4.5 M.I. C-PLASTIC	0.365 0.450 0.270	0.023 0.024 0.023	6.248 7.302 4.622 6.084	0.960 0.640 1.960	0.042	2.5.29 2.20 2.21 2.21 2.21	36.616
19 19 19 19 19 19 19 19	1	4/2/92 RH LAB BOOK PG.103 4/9/92 RHI LAB BOOK PG.107	LAMINATED 854 GC23M WITH CAPON L/12M 154 MICHOTHEME 4.5 M.I. C-PLASTIC C-PLASTIC LAMINATED 644 GC23M 6.168PFFE DUPONT TO C-PLASTIC 4. pb FOIL SINGLE APPLICATION OF RESIN	0.630	0.025 0.024 0.024 0.024	9.921 9.350 10.417 9.866 1.765	1.000 1.500 0.740 1.500 117.500 117.500		9.443 14.764 7.283 10.639 12.425 131.125 237.470	7.415
3 3 9 9		4/9/92 RNELAD BOOK PG.107 4/14/92 RNELAD BOOK 1/6.113	LAMINATED 845 GC23M LASPITE DUPORT TO C-PLASTICE & PD FOLL DOUBLE APPLICATION OF RESIN LAMINBATED 854 GC23M 155 MICHOTHENE 1.5 MICHOTHENE 1.5 MICHOTHENE 1.5 MICHOTHENE	3.630	1900	23.420	2000 2000 2000 2000 2000 2000 2000 200	77.5	1232.136 1173.612 1370.662 1250.070 4.311 4.526 4.526	5273.261
LAMINATED 0.275 0.208 0.521 0.495 0.210 0.926 THIN/THIN 0.265 0.207 0.532 0.500 0.209 0.769 GC23N-2 /C-FLASTIC 0.275 0.207 0.532 0.500 0.209 0.942 LAMINATED 0.420 0.031 5.334 3.800 0.031 48.260 LAMINATED 0.420 0.032 3.076 0.800 0.031 111.760 CC23N-3 /C-FLASTIC 0.220 0.033 2.625 6.400 0.032 79.587 LAMINATED 0.300 0.032 4.675 4.300 0.032 52.904 THIN/THIN 0.440 0.633 5.249 5.500 0.032 67.667 CC23N-4 /C-FLASTIC 0.430 0.631 5.445 5.500 0.032 67.667 CC23N-4 /C-FLASTIC 0.430 0.631 5.445 5.500 0.032 67.667 CC23N-4 /C-FLASTIC 0.430 0.631 5.461 5.500 0.032 67.667 CC23N-4 /C-FLASTIC 0.440 0.631 0.631 5.461 5.500 0.032 67.667 CC23N-4 /C-FLASTIC 0.440 0.631 0.631 5.461 5.500 0.032 67.667 CC23N-4 /C-FLASTIC 0.440 0.631 0.631 5.461 5.500 0.032 67.667 CC23N-4 /C-FLASTIC 0.440 0.631	1 -	4/14/92 Red LAB BOOK PG.113 4/24/92 Red LAB BOOK PG. 120	LAMINATED 854 GC23M- 154 MICROTHEME 1.5 M.I. W/J) pb FOIL LAMINATED THICK/THICK GC23M-1 /C-PLASTIC	0.259 6.295 6.295 0.396 0.280	0.030 0.206 0.206 0.206 0.208	3.201 0.564 0.564 0.556 0.536 0.536	1.730 2.350 3.600 3.600 0.390 0.430	20.00 20.00	22.703 36.846 47.244 33.596 1101111111111111111111111111111111111	32.063
LAMINATED 0.420 0.031 5.334 3.800 0.031 48.260 THICK,THIN 0.250 0.032 3.076 8.800 0.031 111.760 GC23R-3 /C-PLASTIC 0.220 0.033 2.625 6.400 0.032 78.740 LAMINATED 0.340 0.032 4.675 4.300 0.032 52.904 THIR/THIN 0.440 0.033 5.249 5.300 0.032 60.845 GC23R-4 /C-PLASTIC 0.430 0.031 5.449 5.500 0.032 67.667	1	4/24/92 Refit LAB BOOK PG. 120	LAHINATED THIMATHIN GC23N-2 /C-PLASTIC	0.275 0.265 0.275	0.208 0.206 0.207	0.521 0.502 0.523 0.515	6.495 6.416 6.506	0.210 0.210 0.209	0.928 0.769 0.942 0.880	78.763
LAMINATED 0.380 0.032 4.675 4.300 0.032 THIN/THIN 0.440 0.033 5.249 5.300 0.033 GC23M-4 /C-PLASTIC 0.430 0.031 5.461 5.500 0.032		4/24/92 RMH LAB BOOK PG. 120	LAHINATED THICK/THIN GC23N-3 /C-PLASTIC	0.420 0.250 0.220	0.031 6.632 6.033	5.334 3.676 2.625 3.678	3. 800 6. 400	0.031 0.031 0.032	48.260 111.760 78.746 79.597	2063.769
5.6 4.13		4/24/92 RHH LAB BOOK PG. 120	LAHINATED THIN/THIN GC23N-4 /C-PLASTIC	0.380 0.440 0.430	0.032 0.033 0.031	4.675 5.249 5.62	4.300 5.300 5.500	6.03 6.03 6.03 6.032	52.904 60.845 67.667	

SAMPLE NO.	DATE	NATERIAL COSTOSITION	RESISTANCE (OHN) REPORE	THICKESS (INCK)	(OMI-CA) BEFORE	RESISTANCE (OUN) AFTER	THICORESS (TRCE) APPER	MASSERTATIFY (OMB-CN) AFTER	3
1 87	4/24/92	LAMIMATED	0.350	0.121	1.139	0.570	0.122	1.839	
	RM LAB BOOK	THICK THIN	9.500	0.122	1.072	0.520	0.123	7.66	
	PG. 120	6C23 E-5 /C-PUAST IC	0 · 280	0.123	0.896 1.302	9.320	0.123	1.86	15.906
76.	4/24/92	LAMINATED	0.285	0.124	0.905	2.350	0.125	7.462	
	BHE LAR BOOK	THE PERSON	0.275	0.126	0.159	2.540	0.126	4.192	
	FG. 120	GC23N-6 /C-PLASTIC	0.270	0.126	0.04	2.300	0.123	7.362	באני פער
		=		***********		************		100111111111111111111111111111111111111	
77	5/12/92	LANIMATED						•	
	ACT LAB BOUR	00.438-18-3/34 Bh. Bott							
	- Fg. 1.50	C-PLASTIC	0.360	0.026	5.451				
		LAMINATED							
		GC238-15-3/92							
		7101-01	9000	900 0	1 111				
		7110011-7			100.0				
		LAMINATED							
		GC23N-B-3/92							
		Pb-FOIL	•						
				0.02/	7.5.4	***********	1444444444	100000000000000000000000000000000000000	
12	78A 6/5/92								
	RMH LAB BOOK	GC23N, MICROTHENE 6							
	Pg.131	C-PLASTIC							
	POROSITY TEST	~	0.228	0.030	2.992	0.380	0.030	1.967	66.667
	AFTEK	28	0.185	0.030	2.428	S. 200		76.115	3035.135
	RESIN TREATMENT	×	0.210	6.027	3.062	0.660	0.020	9.20	23.62
	TESTING ON THE								
	APTER 3 POINT								
*******				**********					
78	5/20/92		,	•	-				
	Krei LAB BOOK	*CE-1-NCZOS	0.520	9.0	1.451	3. /00	0.0	31.00/	956.110
	FOR ACTO		0.335	0.044	2.997	2.200	0.044	19,685	356.716
	ARSORBTION TEST	MICROTHERE		•					
	ON 3/92	GC23N-3-60.3%	0 . 490	0.039	4.946	21.000	0.041	201.652	3976.655
		KYNAR							
		GC23N-4-80.3%	0.435	0.037	4.629	13.500	0.038	139.867	2921.779
********		KYRAR/CATON							
18	5/27/92								
	NAME LAS BOOK	GC238-1-858	0.360	0.040	3.543	0.445	0.040	4.380	23.611
	Pg.139/141	HI CROTHENE/CAPOM							
	REMAKE OF TEST	GC23K-2-65%	0.495	0.039	4.997	0.525	0.03	5.439	1.152
	79A USTING	MICHOTHERE	,			į			
	76/5	GCZ3N-3-60.3%	0.223	T	1.995	0.253		197.7	13.435

REVISED-	21-0CT-1992			STABILITY	TESTING				
SAMPLE NO.	DATE	MATERIAL COMPOSITION	RESISTANCE (OHN) BEFORE	THICKNESS (INCH) BEPORE	RESISTIVITY (ORN-CR) BEFORE	RESISTANCE (OBH) AFTER	THICKNESS (THOSE) AFTER	(OMP-CH)	S CONTRACTOR (S)
110	-				Kynar/Capon 1818 1818 1818 1818 1818 1818 1818 181				***************************************
	Pg.145 Remake of test 78 Using 5/92					,			
100	624668868888888888888888888888888888888								
		and C-Plastic	0.380	9 60.0	1.527	23.300		93.604	6031.579
*********	from And Corp.					10000000000000)00000000000000	
*	6/26/92 bad: 1.a.h. 20.04								-
	Pg.151	Kynar 7201 & 711							
	7201 4 711	Capow			;		į		
		704-7201	1. 700 5.40	0.031	21.590 6.854	26.300 220.000	0.031	2624.672	38171.665
		851-711	0.450	0.059	3.003			:	
		-7201	0.785	0.032	9.686	1.750	0.031	22.225	130.121
		851-7201 6 Capow	0.320	0.062	2.032	- 100	760.0	2	
					***************************************	***********	************		**************************************
40	R.M.W. lab book	LATINIES							
	pg.154	lastic	-						
		711 Kynar & Pb Dust		6 633	116 33			:	
	•	10%-W/CA-DUST	90,00	0.022	16.737				
		708-W/O CA-POIL	2.150	0.022	38.475				
		70%-W/O CA-DUST	0.320	0.025	5.039	71.500	0.025	1125.984	22243.750
		75%-W/CA-POIL	0.097	0.024	1.591	12.60	27.	1164, 361	15570, 141
		758-W/O CA-POIL	1.250	0.025	19.685				
			0.300	0.026	4.543	70.000	9.026	984.252	21566.667
	自動物の主要を含むなののでは、 一般のでは、 一般のでは、 一般のである。 「 こうしょう こうりょう しんりん しんりん		#						
	R.M.H. lab book	Kynar-711							
	pg.159/160	C-Plastic	•		į	•		į	986
	050	.013-C-Plastic	0.110	0.013	J. 531	6 .115	0.017	3.773	167.61
	Sev 1		1.150	0.042	10.780	3.850	0.042	36.019	234.763
-	repressed at 540 F		1.550	0.030	12.205	1.130		9.26	-24.059
	for butter resistivity	050	1.650	F. 60 .	17.030			•	
100000001	· · · · · · · · · · · · · · · · · · ·	-	***********		**************	***********			100000000000
426	7/22/92	LEAD DUST 6	6.043	0.02					•
	R.M.H.1ab book pg.167	PREMIXED W/1.1.1							
		DAIRD PRESSED AT							

REVISED-	21-0CT-1992			STABILITY	TESTING				
SAMPLE NO.	DATE	HATERIAL COSPOSITION	RESISTANCE (OHH) BEFORE	THICKNESS (INCH) BEFORE	RESISTIVITY (ORH-CN) REPORE	RESISTANCE (OMI) AFTER	THICKESS (INCH) AFTER	RESISTIVITY (ORS-OR) ATTER	
45	94A 7/26/92 R.H.H. lab book pg.170/171	KYMAN-711							
	•	KETJENBIACK WITH KYRNA-711 14%-KET/KYR-,050 14%-KET/KYR-,040 14%-KET/KYR-,040	0.305 0.305	0.06 0.061 0.051	1.766 2.453 3.66		0.0 0.0 0.0 0.0 0.0	2.779 2.502 5.713	57.377 5.263 46.000
		pb/RADEL 0.066	0.066	0.025	0.025 1.639 0.570 0.025 0.976 763.636	0.570	0.025	0.976	763.636
4	7/30/92 R.H.H. lab book pg. 173/174		6	6.06.6 6.06.6	1.919		6 6 6 6 8 6 7 8 6	2.55	13.115
		14%-KET/KYN-,030 14%-KET/KYN-,020 14%-KET/KYN-,026	6.255 6.255 6.243	0.043 0.043	2.335 2.036	1.150 4.200 Sample	7	36.454 BEGQ	1547.059
" 496 496 44	######################################	LAMINA LAMINA M.Mi Ket jenbl Microth	-						
	325£/3000# used to make laminates	80%	0.620	0.071 0.063	3.438 2.675		0.071 0.063	4.549	3.226 4.346
20 00 00 00 00 00 00 00 00 00 00 00 00 0	978 8/18/92 8/		0.210	0.052	1.590	1.65	90.052 0.052	12.492	68.71
**************************************	1 Design Property 1998 1998	CAMENA	-	0.067	0.218 0.067 1.281 0.290 0.067	6.290 H111111111111		•	33.020
	pg.185/186 400£/3000# used to make laminates	Ket /kyner 751 — 994-1 751 — 994-2 751 — 994-3	0.250 0.220 0.225 0.185	0.074 0.050 0.060	1.330 1.140 1.476	6.310 6.320 6.510	0.074	1.649 1.630 3.346 2.165	26.00 65.00 136.667
102A 102A	102A PUBLICABETHER STREET 102A P. 16/92 P. 16/92 P. 16/92 P. 18/9 P. 1	LAMINA LAMINA MIC ET/MICRO	=	0.061 0.073	0.061 10.004 2.400 0.062 15.240 52.341 94.374 94.374	2. 400 1. 630	0.062 7.003	15.240 0.334	\$2.341 \$4.376
						607		***	784 TO

SAMPLE NO.	DATE	MATERIAL F	RESISTANCE (OHN) BEFORE	THICKNESS (INCH) BEPORE	RESISTIVITY (OHH-CM) BEFORE	RESISTANCE (OW) ATTER	THICHESS (INCH) AFTER	RESISTIVITY (ORM-CH) AFTER	Constant Constant (c)
	material from ALCAN CHEN.LTD.	801-GERED-102A-4	1.130	0.046	9.671	1.630	0.048	15.610	55.199
**************************************	66686666668888888888888888888888888888								
	used to make laminates	103A-1 103A-2 103A-3	0.580 0.595 0.375	0.080 0.063 0.053	2.854 3.718 2.953	1.500 6.900 2.800	0.000	7.302 37.495 22.047	154.621 28.621 56.653
		1037-4	0.355	9.040	3.494	12.500	• • • • • • • • • • • • • • • • • • •	123.631 	3421.127 199999999
4	9/29/92 RWH lab book Pg.193 350£/3TONS used to make							•	
	laminates	1048-1	0.45	90.0	2.9			: z :	627.73
		104A-3	0.355	0.073	1.915	2.900	0.073	15.640	716.981
		104A-5	0.720	0.048	3.906	10.300		84.482	1330.55
		104A-6	0.700	0.062	4.45		0.062	34.925	615.71
		104A-7	6.439	990.0	2.714	90.7	96.	25.650	, y
105A 105A	105A 10/9/92 105A 10/9/92 RMH 1ab book	ETRAR (7/92) & HTCROTHENE (5/92)	901001000						
	pg.199 350£/3TONS	10%-LOADING	į	;		•		;	
	used to make laminates		6.170	0.036 0.053	1.374		. 65	3.796	321.622
		30% T/04MEC105A-3 40% T/60% MEC105A-4	0.173 0.165	0.033 0.050	1.285	1.150 2.100	•. 659 •. 050	22.042	1596.97
109A 109A	**************************************						<u> </u>		
		109A-1 109A-2 1898-3	0.290 0.360	0.041	2.785 3.543 3.169	0.870	0.040	0.563	141.667
			0.40			0.850	6.041	6.162	83.75
100	110A 120-00-00-00-00-00-00-00-00-00-00-00-00-0	LANTRATES 004 (Appendix (5/92) NICHO. (5/92) 4		2					
	400F/3 TOMS	1104-1	0.225	0.038	2.331	4.900	0.030	26.767	201.71
		110A-2	0.350	0.039	3.533		0.030	46.455	1271.42
	400F/3 TORS	1104-3	0.220	0.042	2.062	2.73			

REVISED-	21-DEC-1992			STABILLI	14.5T.1M4				
SAMPLE NO.	DATE	MATRIAL	RESISTANCE (OHH) BEPORE	THICONESS (INCH) BEFORE	RESISTIVITY (ORF-CN) BEFORE	RESISTANCE (OBN) ATTER	THICKNESS (THCH)	(OME-CR)	2 8 2
	3508/3 7088	HICHO. AND SEE SEE LOADING							1
		1112-1	1.000	0.042	9.374	1.950	7.045	19.77	
	350r/J TORS	1112-2	2.100	0.043	19.227	3.600	0.00	27.467	42.857
	400F/3 TONS	754-LOADING	6	6	176	1,288	6.653	1.914	28.98
		HICEO MINES	-						
	350F/3 TONS		1.800	0.036	19.685	2.000	0.036	23.872	11.111
10000000000000000000000000000000000000	66666666666666666668896688666666666666	CATERIAS PROPERTY PROPERTY							
		(7/52) KYRAN (7/92)	-						
		EXECUTE (7/92) 112A-1		0.00	9.664			9.	8.3
	400F/3 TORES	1128-2	0.165		6.736		• .		A
		LANTIMATES 104 LOADTHG 120 WASHED					,	;	
	325F/3 TONS	1128-3	0.460	. 65 . 65 . 65	2.625 3. 045		35		
113A	113A 11/10/92	=	000000000000000000000000000000000000000		************				
		H20 NASHED 403 (THERE) 1/92) HICONTRINE (5/92) CANON L38/H PRECISIONINED							
	325F/3 TORS	133-1	0.490	0.064	3.014	4.700		20.912	159.184
	325F/3 TORS	1133-2	0.370	9.0	2.207	4.50		4.522	136.111
	325F/3 TORS	1138-3	9 7 P	0.061	2.374	9.710	0.06	4.111	13.171
10000000000		=	*********	**********		************			
4	SAME AS 113A EXCEPT CAPON HIXED TIPTO CAPON HIXED	3 £							
		PRECORPOUNDED C-PLASTIC	•	3		27	0.062	11.113	176.94
	325F/3 TONS	1143-1	0.430		2.396	1.36	9	7.760	223.810
		1144-3	0.160	9.00	2.663	56.		5.616	136.13 64.063
	124F /1 TMMS	1144-4	0.640	9. 8.76	3.315				

3257/3 TONS 3257/3	SAMPLE DATE DATE DATE DATE							
1347 1247 124 12	11.24/92	RESISTANCE (OBM)	THICKNESS (THOSE)	RESISTIVITY (OFFI-CR)	RESISTANCE (OFFI)	THICKNESS (DRC)	(OBE-CH)	
1357 100 Name 1357 1357 1357 1357 1357 1357 1357 1357 1357 1	11.24/92	BEFORE			ATTA	Merria	ACTES.	(6)
TIENT WATER THE THE TIENT WAS NOT THE THE THE THE THE THE THE THE THE TH	17-25 ECO WASHED			***************************************	**********		***********	
MARINE TICKED MARINE TICKED	Particular Par	9						
C-FACATION C-F	125F/3 TONS	_						
1257/7 TOTAL STATE 127/1004 CANATIC 127/1004	125F/3 TONS							
1387/3 TONE 1387/4 COARREY 0.140 0.172 2.140 0.172	125F/3 TONS 125F/3	*						
1357/3 TOME 1364-1 COMMENT 1574/3 TOME	125F/3 TONS							
1257/7 TOTAL 1157/2 TOTAL 1157	125F/3 TONS	•	-	•	ACR 6		2,843	34,743
1357/7 Total 1357	125F/3 TONS		0.073	1.914	0.520		2.043	14.571
1154/7 Trons 1154-4 March 1154-1 March 1154	1154-1 MEDIUS-X 1154-1 MEDIUS-X 1154-1 MEDIUS-X 11725/92		0.062	2.921	996.0	0.062	960.9	106.696
11.75/73 11.75/73 12.0 tabales 11.75/73 12.0 tabales 1			0.067	3.400	1.100	0.067	6.934	103.440
INCAT ALL (7.42) ECO MARKED ECO EC	HEAT - ALL							
17-10 17-1	HEAT - ALL	1						
The position Companies C		ero						
PRESCRIPTION PRES	PRECOMPOUNDED	4 -						
125f/3 TONS 1164-1 COUNTY 1.952 1.154 1.254 1.257	125F/3 TORS							
1357/3 TONS	127.07GNS CAPON L30./N 1258/3 TONS 1168-1 COANSE 0.3 1258/3 TONS 1168-1 REDUN 0.3 1278/3 TONS 1178-1 0.3 1278/3 TONS 1178-1 0.3 1278/3 TONS 1178-1 0.3 1178/3 TONS 1178-1	•						
1257/3 TONS 1164-1 CANAER 0.370 0.677 1.852 3257/3 TONS 1164-1 CANAER 0.300 0.671 1.644 3257/3 TONS 1164-1 CANAER 0.300 0.671 1.644 3257/3 TONS 1164-2 CANAER 0.300 0.671 1.644 3257/3 TONS 1164-1 CANAER 0.300 0.672 1.539 1174 12/43/92 1.441 1.	325F/3 TONS 325F/3	×						
1257/3 TORS 1164-1 COAMSS 0.170 0.077 1.892 1257/3 TORS 1164-1 COAMSS 0.170 0.671 1.644 1257/3 TORS 1164-1 MEDIUM 0.610 0.666 3.439 1257/3 TORS 1164-1 MEDIUM 0.610 0.666 3.439 127/3 TORS 1164-1 MEDIUM 0.610 0.666 3.439 127/3 TORS 1164-1 MEDIUM 0.610 0.666 3.439 127/3 TORS 1247 0.430 0.640 0.671 0.180 0.071 0.440 127/3 TORS 1247 0.430 0.430 0.671 0.430 0.671 0.430 127/3 TORS 127/3 TORS 0.420 0.641 0.430 0.664 0.644 0.441 127/3 TORS 127/3 TORS 0.420 0.641 0.441 0.460 0.644 0.441 127/3 TORS 127/3 TORS 0.420 0.641 0.441 0.460 0.644 0.441 127/3 TORS 127/3 TORS 0.420 0.644 0.441 0.464 0.46	125F/3 TONS 116A-1 COARSE 0.3 125F/3 TONS 116A-2 COARSE 0.3 125F/3 TONS 116A-3 MEDIUM 0.4 12/01/92 126A-2 COARSE 0.3 126A-4 MEDIUM 0.4 12/01/92 126A-4 MEDIUM 0.4 12/01/92							
3227/3 TONS 1164-1 PEDIGN 0.510 0.667 5.731 1.514-2 DOUGH 0.510 0.667 1.514-2 DOUGH 0.510 0.671 0.571 0.570 0.671 0.671	125F/3 TORS 116A-2 COMMSS 325F/3 TORS 116A-3 NEDIUM 0.3 117A 12/03/92 104 LANIMATS CAPON/MICROTHENE (7/02) N20 NASHED MIXED FIRST 204 MASHED MIXED FIRST 204 (134) 0.3 117-2A (134) 0.3 117-2A (134) 0.3 117-2A (134) 0.3 117-2A (134) 0.3 117-4A (134) 0.3 MIXED FIRST (7/02) N20 MASHED		6.67	1.192				
325/3 TORS	1277.3 TORS 116A-4 REDUCE 0. 12/3/92 1005 116A-4 REDUCE 0. 12/3/92 1005 100101 116111111111111111111111111		179.0					
17.4 12/8/92 LANIMARS LAN	12.03.92	0.610	9.066	3.639		•	•	
LANGE 12/03/72 03 LOADING 12/03/72	IIIA							
CAPOM/MICROTHERN 7/92 M20 MASHED MIXED FILET 284 MASHED MIXED FILET 284 MASHED MIXED FILET 284 MASHED MIXED FILET 285 MASHED 285 MASHE	CAPOM/MICGOTHENE (7/92) H20 WASHED MIXED FIRST 20% MICHOTHENE THEN INTO SMEET 20% MICHOTHENE THEN INTO SMEET 20% MICHOTHENE THEN INTO SMEET 20% MICHOTHENE 1136/M 126/M	1						
MARCO FIRST 200 MICHOLINEAR 201 MICHOLINEA	MIXED FIRST 200 MIXED FIRST 20	9						
135 TO .451 CAPUM 1.54 TO .451 CAPUM 1.55 TO .451 CAPUM 1.55 TO .452 CAPUM 1.55 TO	C-FLASTIC 15% TO . 45% CAPON 138/M 125/3 TONS 117-1A (.15%) 0. 118-1A (.15%) 0.							
13	1154 TO .454 CARON 1367 13757 TO .454 CARON 13757 TO .454 117-3A (.154) 0. 118A 12/07/92 LANTHARE CAPON/SHO2 60% LANDING EMBED HIXED PINST (7/92) H20 04/8HED THEN HICHOTHEME 20% HICHOTHEME							
135F/3 TOMS	125F/3 TONS 117-1A (.154) 0. 117-1A (.154) 0. 117-3A (.264) 0. 117-3A (.264) 0. 117-4A (.194) 0. 117-5A (.194) 0. 117-5A (.194) 0. 117-5A (.194) 0. 117-5A (.194) 0. 118-5A (.194) 0. 118-5A (.194) 0. 118-5A (.194) 0. 12/67/92 (.7/92) 0.0 00.000000000000000000000000000000	30						
117-1A (135) 0.500 0.001 2.020 0.001 0.377 125.000 0.001 1.777 125.000 0.001 1.777 1.777 1.777 1	117-14 (134) 117-14 (134) 117-24 (134) 117-3 (134) 117-4 (134) 117-4 (134) 117-4 (134) 117-5 (134) 0.117-4 (134) 0	•		•			717 \$	147, 885
117-34 (.254) 0.420 0.068 2.432 0.700 0.066 4.176 71.717 117-34 (.254) 0.420 0.066 2.432 0.700 0.066 4.176 71.717 117-34 (.254) 0.420 0.068 2.242 0.700 0.069 5.674 75.000 117-34 (.254) 0.420 0.071 2.329 0.900 0.066 5.674 75.000 117-34 (.454) 0.460 0.065 2.706 117-	117-1A (.254) 0. 117-5A (.354) 0. 117-5A (.354) 0. 117-5A (.354) 0. 117-5A (.454) 0. 117-5A	.	0.07	2.828	1.150	.07	6.377	125.69
117-4A (.301) 0.560 0.066 3.242 0.900 0.066 5.674 75.000 117-5A (.351) 0.420 0.071 2.329 117-5A (.451) 0.460 0.065 2.706 117-5A (.451) 0.460 0.064 3.977 117-7A (.452) 0.460 0.064 3.977 117-7A (.454) 0.460 0.064 3.977 117	117-4A (.304) 0.3 117-5A (.334) 0.3 117-5A (.334) 0.3 117-5A (.434) 0.3 117-5A (.434	•	990.	2.432	0.700	990.	4.176	לוו.וו
117-5A (.35%) 0-420 0-011 2.329 117-5A (.46%) 0-450 0-655 2.746 117-7A (.45%) 0-640 0-664 3.957 117-7A (.45%) 0-640 0-664 3.957 117-7A (.45%) 0-640 0-664 3.957 12A 12/07/92 LAMIMATE CAPOW/SHO2 03 LOADING UMENT HIXED FIRST (7/92) H20 NGSHED THEN MICHOTHENE 20% HICHOTHENE	117-5A (-35%) 0 - 117-5A (-35%) 0 - 117-5A (-45%) 0 - 117-5A (-45%	-		3.242	986.		5.674	3.5
117-7A (.45%) 0.640 0.644 3.277 117-7A (.45%) 0.640 0.644 3.277 118A 12/07/92 10% LAMINARS ALKE CAPON/SHO2 10% LAMINARS ALKE PINST (7/92) H20 WASHED THEN MICHOTHEME 20% HICHOTHEME	112-7A (-651) 6. 110-10 (-651) 6. 110-10 (-651) 6. 12/07/92 (-610101010101010101010101010101010101010	• •		2.329				
DEFINEERING STREET OF THE STREET STRE	1164 12/07/92 LATERATE 12/07/92 LATERATE CAPON/SHO2 10% LAADING MEET HIXED FIRST (7/92) R20 WASHED THEN HICHOTHEM 20% HICHOTHEM	0.640		1.937				
118A 12/07/92 LANTHATES CAPON/SHO2 10% LOADING COMPED HIXED FIRST (7/92) H20 WASHED THEN MICHOFHEDE 20% HICHOTHEDE	118A 12/07/92 LANTHATES CAPON/SHO2 80% LAADING MEMBY HIXED PINST (7/92) H20 WASHED THEN HICHOTHEDE 20% HICHOTHEDE PROCEEDINGS	*************			,,,,,,,,,,,,,,,,,		***********	
•	•	1					•	

REVISED	04~JAN-1993			STABILITY	TESTING				
SAPLE NO.	DATE	MATERIAL	RESISTANCE (OBN) BEPORE	THICKNESS (INCH) BEFORE	RESISTIVITY (OBN-CN) BEFORE	RESISTANCE (OPP.) AFTER	THICKNESS (INCH) AFTER	RESISTIVITY (OMF-CR) ATTER	
	811	C-PLASTIC .15% TO .45% CAPOM .13% M .13% M .18-1% (.15%) .118-1% (.25%) .118-1% (.25%) .118-4% (.30%) .118-5% (.30%)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	900000	2.216 2.208 2.208 1.911 1.737		0.00	2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2	19.155
COARSE CO	119A 12/04/92 119A 12/04/92 COARSE (T.) UMED IN 116	116-7A (116-7A	9 . 360 0 . 50 0 . 340 0 . 235 0 . 235		2.001 5.100 5.523 5.523 5.523				
120A	120A 12/16/92 85% LOADING CHEENE PRECONFORNIND WITH MICHOTHENE HIAND COMPOUNDED CARBON PLASTIC VS PRECONFOUNDED CARBON PLASTIC		0 - 130 0 - 130 0 - 130 0 - 140 0 - 130 1 - 300 2 - 300 2 - 300	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	2.919 2.292 2.292 2.396 2.794 9.139		-		
	121 121 121A 121 1217/92 0.05HED 1 TIMES NO BLAT	LANINATES		6 . 6 . 6 . 6 . 6 . 6 . 6 . 6 . 6 . 6 .	2.257 2.416				
122A	122A 12/17/92 CARBON PLASTIC FOWDER PRESSED TO PRECOMPUNINED 55 (99.		3.551 3.386		0.0 180.0	10.00 40.00 60.00	204.340

REVISED-	16-FEB-1993			STABILITY	TESTING				
SAMPLE NO.	DATE	MATERIAL COPPOSITION	RESISTANCE (OHM) BEFORE	THICKNESS (INCH) BEFORE	RESISTIVITY (OSH-CH) BEPORE	RESISTANCE (OHN) AFTER	THICORSS (INCH) AFTER	HESISTIVITY (ORM-CN) AFTER	PERCENT CRANCE (8)
	853 ANTINE PRESSED TO HANDCOPPOUNDED CARBON PLASTIC SHEET		0.410	0.050	3.228	1.450 6.820	0.051 6.652	11.193	246.724
123A VARY & CALOW	123A 01/04/93 VARY & CAFOW CAPOWERS MIXED FIRST THEN MICROTHENE MIXED IN LARGE 8 02. MORTAR AND PEDISTAL	LANINATES 80% LOADING (1792) H20 WESTED 7792) H20 WESTED 20% HICROTHENE HANDCOHEOUNDED 70 - PLASTIC 130% TO 1.00% CAPOM L38/H							
			0 0 1 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2. 141 2. 256 2. 256 2. 256 3. 251 3. 251 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3	0 0 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0	0.490 0.080 2.411 0.580 0.080 2.854 18.367 0.580 0.080 2.854 18.367 0.580 0.080 2.854 18.367 0.580 0.080 2.854 18.367 0.580 0.080 2.854 18.367 0.580 0.080 2.854 0.778 0.480 0.080 2.854 0.778 0.680 0.078 2.221 0.590 0.080 2.510 28.087 0.650 0.078 3.281 0.600 0.076 3.108 0.600 0.076 3.380 0.600 0.076 3.380 0.600 0.076 3.380 0.600 0.078 0.080 4.29 0.600 0.072 3.380 0.600 0.072 3.283	16.367 26.011 28.087
	CAPOMENTE IN THE STAND OF JAND	LANTRATES BO1 LOADING (7/92) H20 WASHED 204 H1CHOTHERS HANDCOMPOUNDED C-PLASTTC 1.51 TO 3.08 CAPOM 1.38/H 325f/3 TONS 124-1A (1.54) 124-1A (1.54)	0.620	0.075 0.075 0.00.0	3.255 5.011 4.300				
125A 125A	125A 125A 125A 125A 125A 01.12/93 VARYING PRESS OF PRECOMDED 953 FROM	= 37 % =	0 - 410	0.057	2.632 5.632 5.642				

REVISED-	16-FEB-1993			STABILITY	TESTING				
SAMPLE NO.	DATE	MATERIAL COMPOSITION	RESISTANCE (OHM) BEFORE	THICKNESS (INCH) BEPORE	RESISTIVITY (ONH-CH) BEFORE	RESISTANCE (OFH) AFTER	THICKNESS (INCH) AFTER	RESISTIVITY (OMI-CN) ATER	PERCENT CRUMOS (%)
		_	0.450	0.051	3.474				
			0.440	0.052	3.331				
		_	0.390	0.051	3.022				
		(3006) VP-C71	2.30	100.0	3.011				
			380	0.057	2,624				
************			000000000000000000000000000000000000000	***********					0000000000
	•	LAMIMATES							
	01/14/93	80% TO 90% LOADING							
	DIFFERENT &								
	CONTINUE DE LA CONTIN	30% CAPOW L38.//							
-	NEW BAG MICHOTHENE	SAMPLES 3-7							
	(10/92)	HANDCOMPOUNDED							
		C-PLASTIC							
		MICHOTHENE (5/92)							
		126-14 (ACE)	1 450	130	90.0				
		126-2A (80%)	2.450	190.0	14. 304				
		126-3A (851)	0.32		1.575	4.0	0.0	1.969	25.000
	PRESS UPSIDE DOWN	126-4A (85%)	0.27	0.076	1.399	0.33	9.076	1.76	22.22
		275F/3 TONS							
		126-6A (82.5%)	1.4	0.073	7.550	1.45	0.073	7.820	3.571
	PRESS UPSIDE DOWN	126-7A (82.5%)	0.52	0.062	3.302	6.53	0.062	3.366	1.923
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1									
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		858 PELLETS							
DIFFERENT &	853	=							
KETJENBLACK	PELLETS	KETJENBLACK (9/92)							
	FROM	325F/3 TONS					•	-	
			0.54	0.05	4.252				
			9.64	0.048	5.249				
			6.33	0.0	f. 139				
		1971 44-671	9.0	6.01	4.199				
		(\$01) WC-671		9.6	96.6				
		129-78 (228)	0.63	0.051	£91°7				
			0.38	0.05	2.992				
	*****			***********				*************	
1307		Ž.	•	•		į			
	01/13/33		£ .	0.049	3.030	7.		5.745	24.246
	101 000 101	1901) W7-001	‡		• • • • • • • • • • • • • • • • • • •				21.346
	100 DAY TOTAL		•				250		22 646
	MELSENBLANCA (3/34)		•					•	
	356 (3 40) 27)								
	ΩĮ								
	PELLETS								
				*************	*************	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			44444444
		111711711711711177 [AMINATE 3256/3 1085							-
	~	131-1A(3 TORS)		0.061	3.743				
	858	131-3A(15 TONS)	0.74	0.055	5.297				
	ביורים ביים משוי ביים	131 48/18 TONCE	7 0	0.052	3.161				
					1				

13.5 13.5	A TER	NTER NTER	
			3

### 13-4(1792) 133-4(1708) 0.36 0.069 2.054 #### 13-4(1708) 0.32 0.063 1.936 ### 13-4(1708) 0.34 0.32 0.063 1.936 ### 13-4(15 7085) 0.3 0.34 0.051 ### 13-4(15 7085) 0.3 0.052 0.053 ### 13-4(1708) 0.3 0.3 0.053 ### 13-4(1708) 0.3 0.3 0.053 ### 13-4(1708) 0.3 0.3 0.053 ### 13-4(1708) 0.3 0.3 0.053 ### 13-4(1708) 0.3 0.3 0.053 ### 13-4(1708) 0.3 0.3 0.053 ### 13-4(1708) 0.3 0.3 0.053 ### 13-4(1708) 0.3 0.3 0.053 ### 13-4(1708) 0.3 0.3 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0			
Style="background-color: red; color: red			
PRESSED AT 3 7085 33-4A[15 TOMS 0.44 0.052 3.796			
134			
134 C-PLASTIC 134 LANIMARE 325/3 TONS 22.54 TANIMARE 325/3 TONS 22.54 TANIMARE 325/3 TONS 23.54 TANIMARE 325/3 TONS 23.55 TANIMARE 325/3 TONS 23.55 TANIMARE 325/3 TONS 23.56 TANIMARE 325/3 TONS 23.56 TANIMARE 325/3 TONS 23.57 TANIMARE 325/3 TONS 23.57 TANIMARE 325/3 TONS 23.58 TANIMARE 325/3 TONS 23.58 TANIMARE 325/3 TONS 23.58 TANIMARE 325/3 TONS 23.58 TANIMARE 325/3 TONS 23.59 TANIMARE 325/3 TONS 23.50 TANIMARE 325/3 TONS			
134a 134			
134A 134A LANIMATE 325/3 TORS 0.050			
01/28/9 114-2A(3 TOMS) 0.76 0.056 5.159 0.057 0.057 0.158 0.057 0.			
PRESED AT 3 TONS 134-3A(15 TONS) 0.63 0.657 4.351 0.65	•		
Main 5 Toks 134-34(15 Toks) 0.85 0.059 6.300			
184 C-PLASTIC 134-1A(15 TONS 0.76 0.051 5.867 0.051 184 C-PLASTIC 185-1A(.010") 0.65 0.029 0.124 0.05 0.1724 0.05 0.029 0.124 0.05 0.029 0.124 0.05 0.029 0.124 0.05 0.029 0.124 0.05 0.029 0.124 0.05 0.029 0.124 0.05 0.029 0.124 0.05 0.029 0.124 0.05 0.029 0.125 0.029 0.125 0.029 0.125 0.029 0.024 0.125 0.029 0.024 0.025 0.029 0.025 0.029 0.024 0.025 0.029 0.025 0.029 0.025		.	•
184 C-PLASTIC 185-1A(-010^+) 0.65 0.029 0.24 0.02 0.726/93 135-1A(-010^+) 0.65 0.034 6.946 0.034 0.0	0.61	.05 5.354	187.9-
135A 01/26/93 LANIMATE 325/3 TONS 0.65 0.029 0.024			
THIN UNIVERSES AND 135-2A(.010") 0.65 0.029 8.024 0.029 0.020 0.029 0.020 0.029 0.02			
THIS GENERAL AND 135-2A(.010") 0.6 0.034 6.946 0.034 C-PLASTIC(184) 135-2A(.010") 0.6 0.029 7.602 0.010" AND .006" 135-4A(.006") 0.65 0.029 7.602 0.010" AND .006" 135-4A(.006") 0.65 0.029 7.602 0.010" AND .006" 135-4A(.006") 0.65 0.029 7.602 0.010" 136-A (.006") 0.65 0.029 1.417 0.029 1.417 0.020 1.417 0.020 1.417 0.020 1.417 0.020 1.417 0.020 1.417 0.020 1.417 0.020 1.417 0.020 0.034 4.516 0.020 0.034 4.516 0.034 1.516 0.		200 T	-6.26.9
C-PLASTIC(181) 135-3A(.006") 0.65 0.029 7.602 0.010" AND .006" 135-4A(.006") 0.65 0.029 7.602 0.417 0.010" AND .006" 135-4A(.006") 0.65 0.029 0.417 0.001	•		
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136A 02/01/93 LANINATE 325F/3 TONS 0.39 0.034 4.516 126A 02/01/93 LANINATE 325F/3 TONS 0.39 0.034 4.516 126		•	
136A 02/01/93	•	•	
136A 02/01/93 LAMINATE 325F/3 TONS 136-2A(22%) 0.39 0.034 4.516 22% AND 24% 136-2A(22%) 0.57 0.033 6.806 C.PLASTIC 136-3A(24%) 0.34 0.035 3.025 THIN (,0440000000000		
136-1A(224)			
22% AND 24% 136-2A(22%) 0.57 0.033 6.806 C.PLASTIC 136-3A(24%) 0.34 0.035 3.425 THEN (MINOR 136-4A(24%) 0.39 0.034 4.516 137A 02/03/93 LANINATE 325F/3 TONS 0.24 0.041 2.305 137A 0.24 0.041 2.305 137-3A 0.25 0.042 2.152 1400000000000000000000000000000000000			
C.PLASTIC 136-3A(244) 0.34 0.035 3.825 THIN (TABLE 125 136-4A(244) 0.39 0.034 4.516 137A 02/03/93 LANINATE 325F/3 TONS 674 (TABLE 12 137-2A 0.24 0.041 2.305 184 AND 224 137-2A 0.235 0.042 2.152 C-VLASTIC 137-4A 0.215 0.043 1.969			
THIN (THE FORT THE FO			
137A 02/03/93 CANINATE 325F/3 TONS 137A 02/03/93 CANINATE 325F/3 TONS 674 (17/92) 137-1A 0.24 0.041 2.305 184 AND 224 137-3A 0.205 0.042 2.152 184 AND 224 137-4A 0.215 0.043 1.969 C-PLASTIC 100000000000000000000000000000000000			
137A 02/03/93 LAMINATE 325F/3 TONS 67% (March 17/92) 137-2A 0.24 0.041 2.305 18% AND 22% 137-4A 0.215 0.042 2.859 C-VLASTIC 65% (March 18% 1111111111111111111111111111111111	,00000000000000000000000000000000000000		
137-1A 0.24 0.041 2.305 673 (7/92) 137-2A 0.235 0.043 2.152 184 AND 224 137-4A 0.215 0.042 2.859 C-VLASTIC 634 (2.35) 1.969 C-VLASTIC 635 (2.35) 1.969 635 (2.35) 1.969			
137-2A 0.235 0.043 2.152 137-3A 0.235 0.042 2.859 137-3A 0.305 0.042 2.859 137-3A 0.305 0.042 2.859 1.969 0.042 2.859 1.969 0.043 1.969 0.043 1.969 0.043			
137-3A 0.305 0.042 2.859 18% AND 22% 137-4A 0.215 0.043 1.969 C-VLASTIC C-VLASTIC 02/03/93 LAMINATE 325F/3 TONS 65% 2.725 65%			
18% AND 22% 137-4A 0.215 0.043 1.969 C-PLASTIC C-PLASTIC 02/03/93 LAMINATE 325F/3 TONS 65% LAMINATE 325F/3 TONS			
C-PLASTIC 110111111111111111111111111111111111			
HIBBITITIBET THE THE THE THE THE THE THE THE THE T			
654 (1977) PELLETS ANTINATE 325F/3 TONS 654 (1977) PELLETS 654 (1977) PELLETS 655 (1977) PELLETS			
STELETS AND A 10 A 1			
20 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
CITIC OCO. DE CO TENTA	•		
C MRP-2 0.41 0.061 2.646 4	•		
0.030" THICK PRP-3 0.49 0.054 3.572	•		
MSP-4 0.43 0.058 2.919	•		9.303

DATE		RESISTANCE	THE COMPANY		
DUPLICATE OF 135A 554 (FRICTHIN) 184 C-FLASTIC (THIN) 184 C-FLASTIC PRESSED TWICE HIRITHIERRERIERS 18 A 224 C-PLASTIC PRESSED TWICE HIRITHIERRERIERS 18 A 224 C-PLASTIC PELLETS (2/93) 18 A 224 C-PLASTIC PELLETS (2/93) 18 STEARIC ACID 18 STEARIC A			(SDEE) ATTA	(Oun-Oil)	3
DUPLICATE OF 135A 954 CHICTHIN) 164 C-PLASTIC 16 C-PLASTIC 16 A 22 C-PLASTIC PROSED TWICE HINGHHERHRERHERER 02/05/93 LAM 654 CHICKTIC BR-1 AND BR-2 654 CHICKTIC PROMPTER 18 STEARIC ACID 18 STEA					
######################################	62				
654 CFLASTIC (THIN) 164 C-PLASTIC (THIN) 02/05/93 LAND 15 4 224 C-PLASTIC PRESSED TWICE HINGHHEIGHHEIGH 02/05/93 LAND 624 CFLASTIC PROMPED R3-1 AND R3-2 1 PIECE LAMINATE HINGHHEIGHHINGHING 02/11/93 LAND 654 CFLASTIC PELLETS(2/93) HINGHHEIGHHINGHINGHING 655 CFLASTIC PELLETS(2/93) HINGHHEIGHHINGHINGHINGHING 655 CFLASTIC PELLETS(2/93) HINGHHEIGHHINGHINGHINGHINGHINGHINGHINGHINGHINGH	82				
161 C-FLASTIC (THIN) (THIN) (1) (2/5/9) LAND (02/6/9) LAND (1) A.22 C-PLASTIC (PRESED TWICE (PRESED TWICE (PROPERTY) (1) AND BR-2 (1) A	03				
######################################	37				
02/05/93 LANE 02/05/93 LANE 18 4 224 C-PLASTIC PRESSED TWICE 19 4 224 C-PLASTIC PRESSED TWICE 19 10 PELLETS FROM TO 02/05/93 LANE 10 PELLETS 10			٠		;
19-10.5733 19-10.10.1 10-39 0.022 10-22 19-10.10.1 10-30.10.3 0.35 0					
19-1A(181) 19-1A(181) 0.39 0.022					
State	79	•	0.022	15, 191	1130.769
St. C.PLASTIC 139-3A(22) 0.33 0.026		8.8	0.024	95.144	1570.261
PRESERD TWICE 139-4A/121 0.4 0.027		1.95	9.026	29.528	190.90
BEALETT BEAL		1.65	0.827	24.059	312.500
02/05/93 LAMINATE 325/3 TONS 654 CATC PELLETS BR-1 654 CATC CATC CATC CATC CATC CATC CATC CAT	*********	88888888	01000000000		1000000000
## 0.76 0.039 ## 0.76 0.039 ## 0.76 0.039 ## 0.47 0.042 ## 0.47 0.042 ## 0.47 0.042 ## 0.47 0.042 ## 0.41/93					
### PELLETS ### PELLETS #### ################################		1.15	0.039	11.609	51.316
Reconstruction Radio Rad		1.15	0.039	11.609	35.284
BR-1 AND BR-2 65% CHECK 65% CHECK 1		}			
B54 Mark Bridge B3-1 0.47 0.042					
STATE STAT		;			-
IAND R3-2 18-2 0.51 0.649			710.0	7.593	72.340
R3-1 AND R3-2		~:	0.00	2.23	115.686
3 PIECE LAMINATE 3 PIECE LAMINATE 142-18(13) 0.115 0.033 0.2/11/93 LAMINATE 325/3 TON3 0.125 0.033 142-18(13) 0.115 0.033 142-28(13) 0.115 0.033 142-38(13) 0.115 0.033 142-38(13) 0.115 0.033 142-68(13) 0.115 0.033 143-68(13) 0.12/93 LAMINATE 325/3 TON3 0.102 0.036 0.2/12/93 LAMINATE 325/3 TON3 0.2/12/93 LAMINATE 325/3 TON3 0.2/12/93 LAMINATE 325/3 TON3 0.2/12/93 LAMINATE 325/3 TON3 0.100 0.030 0.2/12/93 LAMINATE 325/3 TON3 0.100 0.030 0.2/12/93 LAMINATE 325/3 TON3 0.100 0.030 0.100 0.030 0.115 0.030 0.12/0.030 0.13/0.030 0					
142-14(1%)					
02/11/93 LANIMARE 325F/3 TONS 85% CAPLAGYTC 142-2A(1%) 0.135 0.033 142-2A(1%) 0.115 0.033 142-2A(1%) 0.115 0.033 142-3A(3%) 0.115 0.033 142-5A(3%) 0.115 0.033 142-5A(5%) 0.115 0.033 142-6A(5%) 0.115 0.032 02/12/93 LAMINATE 325F/3 TONS 0.102 0.036 143-4A(1%) 0.102 0.036 143-4A(1%) 0.102 0.036 143-5A(10%) 0.102 0.036 143-5A(10%) 0.13 0.036 143-5A(10%) 0.13 0.036 143-5A(10%) 0.13 0.036 143-5A(10%) 0.13 0.036 144-3A 0.15 0.020 144-3A 0.150 0.029					
142-14(1%) 0.135 0.033 142-24(1%) 0.12 0.033 142-34(1%) 0.12 0.033 142-34(1%) 0.115 0.033 142-34(1%) 0.102 0.033 142-34(1%) 0.102 0.033 142-34(1%) 0.115 0.033 142-34(1%) 0.115 0.035 142-34(1%) 0.102 0.035 143-34(1%) 0.102 0.035 143-34(1%) 0.13 0.035 143-34(1%) 0.13 0.035 143-34(1%) 0.13 0.035 143-34(1%) 0.13 0.035 143-34(1%) 0.13 0.035 143-34(1%) 0.13 0.035 143-34(1%) 0.13 0.035 143-34(1%) 0.14 0.035 143-34(1%) 0.14 0.035 143-34(1%) 0.150 0.025 143-34(1%) 0.150 0.025 143-34(1%) 0.150 0.025 143-34(1%) 0.150 0.025 143-34(1%) 0.14 0.025 143-34(1%) 0.14 0.025 144-34 0.14 0.025 144-34 0.14 0.025 144-34 0.14 0.025 144-34 0.14 0.025 144-34 0.14 0.025 144-34 0.14 0.025 144-34 0.14 0.025 144-34 0.14 0.025 144-34 0.14 0.025 144-34 0.14 0.025 144-34 0.14 0.025 144-34 0.14 0.025 144-34 0.14 0.025 144-34 0.14 0.025 144-34 0.14 0.025 144-34 0.14 0.025 144-34 0.14 0.025 144-34 0.025 0.025 144					
0.12 0.13 0.14 0.13 0.14 0.15		4.5	0.035		17011.111
C-PLASTIC 142-3A(3%) 0.115 0.033 C-PLASTIC 142-4A(3%) 0.102 0.033 142-6A(5%) 0.115 0.033 142-6A(5%) 0.115 0.033 142-6A(5%) 0.115 0.033 02/12/93 LAMINAE 235F/3 TONS 0.102 0.035 143-1A(3%) 0.102 0.035 143-2A(3%) 0.102 0.035 143-2A(3%) 0.102 0.035 143-2A(3%) 0.115 0.035 143-AA(6%) 0.115 0.035 143-AA(6%) 0.115 0.035 143-AA(10%) 0.115 0.035 143-AA(10%) 0.110 0.035 15 STEARIC A(10%) 144-1A 0.150 0.025 144-1A 0.150 0.025 146-1A 0.15 0.025 146-1A 0.025		36	0.032		32556.250
C-PLASTIC 142-46(3%) 0.102 0.033 PELLETS(2/93) 142-56(5%) 0.115 0.032 142-66(5%) 0.115 0.033 142-66(5%) 0.114 0.033 02/12/93 LAMINATE 325F/3 TOWS C-PLASTIC 143-18(3%) 0.102 0.036 GS. (C-PLASTIC 143-56(3%) 0.13 0.036 C-PLASTIC 143-56(3%) 0.13 0.036 PELLETS(2/93) 143-56(10%) 0.13 0.035 HREBRERERERERERERERERERERERERERERERERERE		,			
PELLETS(2/93) 142-54(5%) 0.115 0.032 142-64(5%) 0.14 0.033 142-64(5%) 0.14 0.033 02/12/93 LAMINATE 325F/3 TONS 0.102 0.036 85% (17				
142-66(54) 0.14 0.033 0.2712/93 CAMINATE 325F/3 TONS 0.102 0.036 0.2712/93 CAMINATE 325F/3 TONS 0.102 0.036 0.13 0.14 0.13 0.15 0.13 0.15 0.13 0.15 0.13 0.15 0.13 0.15 0.13 0.15 0.13 0.15 0.13 0.15 0.13 0.15 0.1	5				
HORNIER HERE HERE HERE HERE HERE HERE HERE H	2				
02/12/93 LAMINATE 325F/3 TONS 85% CONTROL 143-1A(3%) 0.102 0.036 143-1A(3%) 0.102 0.037 143-3A(6%) 0.13 0.036 C-PLASTIC 143-4A(6%) 0.15 0.035 PELLETS(2/93) 143-5A(10%) 0.15 0.035 PELLETS(2/93) 143-5A(10%) 0.15 0.035 85% CONTROL 144-1A 0.170 0.030 1% STEARIC A(1) 144-3A 0.160 0.029 PELLETS (2/9%) 144-3A 0.160 0.029	0444466444446	0000000	**************	************	1444444444
143-1A(3%) 0.102 0.036 143-2A(3%) 0.102 0.037 143-2A(3%) 0.102 0.037 143-2A(6%) 0.13 0.036 143-4A(6%) 0.15 0.037 143-4A(6%) 0.15 0.037 143-4A(10%) 0.15 0.035 143-4A(10%) 0.1 0.035 143-4A(10%) 0.1 0.035 143-4A(10%) 144-1A 0.100 0.029 145-1A(10%) 0.14 0.025 145-1A(10%) 0.025 145-1A			-		
143-2A(34) 0.102 0.037 143-3A(44) 0.13 0.036 0.0		3	0.032	136.614	74900.000
C-PLASTIC 143-4A(6%) 0.13 0.036 C-PLASTIC 143-4A(6%) 0.115 0.037 PELLETS(2/93) 143-5A(10%) 0.096 0.035 143-6A(10%) 0.1 02/12/93 LAMINATE 325/3 TONS 65% (CONTROL 144-1A 0.170 0.030 3% PARAFEII OIL 144-2A 0.160 0.029 PELLETS (2.93 144-3A 0.160 0.029 PELLETS (2.93 144-4A 0.180 0.029 PELLETS (3.93 144-2A 0.180 0.029 PELLETS (3.93 144-2A 0.180 0.029 PELLETS (3.93 144-2A 0.180 0.029		27.5	0.036	366.744	27609.695
C-PLASTIC 143-44(6%) 0.115 0.037 PELLETS(2/93) 143-54(10%) 0.098 0.035 143-64(10%) 0.098 0.035 143-64(10%) 0.1 02/12/93 LAMINATE 325/3 TONS 85%					
13-5A(101)	70				
13-54(104)					
######################################	7 7				
NATE 325F/3 TONS 144-1A 0.170 0.030 144-2A 0.210 0.020 144-3A 0.160 0.028 144-4A 0.190 0.029 ************************************				***************************************	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
LAMINATE 322F/3 TONS 144-2A 0.170 0.030 L 144-3A 0.160 0.026 144-4A 0.180 0.026 (.::::::::::::::::::::::::::::::::::::					
144-1A 0.170 0.030 L 144-3A 0.210 0.028 144-4A 0.160 0.028 (.::::::::::::::::::::::::::::::::::::	-		•	- :	
144-3A 0.160 0.029 144-3A 0.160 0.029 144-4A 0.190 0.029 (CHART 325F/3 fows 146-2M(10%) 0.16 0.024 146-2M(10%) 0.16 0.024 146-2M(10%) 0.14 0.025		0.270	0.030	3.563	7.12
144-3A 0.160 0.028 144-4A 0.190 0.029 142-4A 0.190 0.029 (CHINTE 325/3 TORS 0.16 0.024 146-2A(10%) 0.14 0.025		0.255	0.029	3.462	21.629
144-3A 0.160 0.026 144-4A 0.190 0.029 144-4A 0.190 0.029 (*::::::::::::::::::::::::::::::::::::					
144-4A 0.190 0.029 144-4A 0.190 0.029 (.::::::::::::::::::::::::::::::::::::		0.210	0.028	2.953	31.250
(CHINATE 325F/3 fors (1-14-2A110%) (1-14-2A1		0.215	6.029	2.919	13,156
(:::::::::::::::::::::::::::::::::::::					
82.5: (16-14(10%) 0.16 0.024 146-24(10%) 0.14 0.025 146-24(10%) 0.14 0.025 146-24(10%)					
82.5: CT 146-2A(10%) 0.14 0.025	25				
	100				
	:				
CTATE CO.D. TABLED C.133	;				
38 STEARIC PRINTS (2/93)					
ACID					

Supplies Composition Com	1048) 8EFORE 0.66 0.66 0.76 0.78 0.105 0.105 0.105 0.105 0.12 0.12 0.12 0.12 0.135 0.1350 0.350	THICKNESS (INCH) BEFORE 0.041 0.041 0.043 0.032 0.043 0.043 0.032 0.032 0.032 0.033	6.338 6.338 6.338 6.910 7.142 3.338 11.117 0.916 0.916 0.916 0.916 0.916 0.916 0.916 0.916 0.916 0.917	20.5 44.5 3.4 1.1 1.1	ATTR (1900)	(CMF-CM) ATTER 196.859 357.845 34.792 1.136.819	30.00 Miles
654 CEP SHEET 228 C-PLASTIC 228 C-PLASTIC 64 LOADING 38 STEARIC ACID 63 FRANFIN OIL 224 C-PLASTIC FELLETS HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH	0.66 0.76 0.76 0.16 1 TONS 0.105 0.069 0.12 0.13 0.175 0.175 0.175 0.175 0.175 0.175 0.175 0.175 0.175 0.175 0.175 0.175 0.185	0.012 0.013 0.013 0.013 0.013 0.013 0.013 0.013	6.338 6.910 7.142 3.535 11.117 0.916 0.916 0.916 0.916 2.916 2.916 2.916 2.916 3.318 3.318 3.318 3.318 3.318 3.512	20.5 44.5 3.4 1.1 1.1 1.1 1.1 1.1 1.1 1.1		196.250 357.345 34.792 6.033 101010101010101010101010101010101010	30C. 61 307. 13 307. 13 307. 13 307. 13 307. 13 307. 13
22% C-PLASTIC PELLETS (2/2) 11010101010101010101010101010101010101	0.86 0.78 0.44 1 TONS 0.105 0.089 1 0.1 0.12 1 0.12 1 0.12 0.175 0.275 0.275 0.275 0.275 0.175 0.175 0.175 0.175 0.185 0.185	0.013 0.013 0.013 0.013 0.013 0.013 0.013 0.013	5.512 3.535 11.117 0.516 0.516 0.516 0.516 2.504 2.504 2.504 2.504 2.504 2.504 2.504 2.504 3.512			357.345 34.792 1.033 1.033 1.034 1.0	9674.419 150.179 110.119 110.119 110.119 110.119
22 C-PLASTIC PELLETS (2/93) HIBBIRER (2/93) 63 FTEARIC ACID 64 FARAPEIN OIL 224 C-PLASTIC PELLETS HIBBIRER HIBBIRER 65 FARAPEIN OIL 224 C-PLASTIC PELLETS HIBBIRER HIBBIRER 65 FARAPEIN OIL 224 C-PLASTIC PELLETS HIBBIRER HIBBIRER 65 FAMILE 65 FAMIL	0.76 0.44 0.44 0.105 0.009 0.12 0.12 0.175 0.275 0.275 0.275 0.275 0.275 0.275 0.275 0.275 0.275 0.275 0.275	0.013 0.032 0.032 0.032 0.032 0.032	7.142 3.535 11.117 0.836 0.946 0.946 0.946 2.006 2.006 2.207 2.207 2.207			34. 792 2. 0.38 2. 0.38 3. 0.3	30.173 130.000 130.000
PELLETS (2/93) HIBBIRER SHERRING 68 LOADING 38 STEARIC ACID C21 C-PELETS HIBBIRER SHERRING 38 STEARIC ACID 68 PARAFIN OIL 224 C-PLASTIC PELLETS HIBBIRER SHERRING 38 STEARIC ACID 68 PARAFIN OIL 224 C-PLASTIC PELLETS HIBBIRER SHERRING 02/13/93 LANI 62/13/93 LANI 63/13/10 PELLETS HIBBIRER SHERRING 10/13/93 LANI 63/13/93 LANI 63/13/10 PELLETS HIBBIRER SHERRING 10/13/93 LANI 63/13/93 LANI 63/13/93/93 LANI 63/13/93/93/93/93/93/93/93/93/93/93/93/93/93	0.44 9.7045 9.7045 9.005 9.009 0.12 0.275	0.017 0.037 0.013 0.043 0.043 0.052 0.052	3.535 1.117 0.836 0.954 0.954 3.383 2.596 2.207 2.207 8.512				
62 LOADING 34 STEARIC ACID 64 PARAFIN OIL 224 C-PLASTIC 86 LOADING 34 STEARIC ACID 65 PARAFIN OIL 224 C-PLASTIC PELLETS 18 STEARIC ACID 65 PARAFIN OIL 224 C-PLASTIC PELLETS 18 STEARIC ACID 62 PARAFIN OIL 224 C-PLASTIC PELLETS 18 STEARIC ACID 62 PARAFIN OIL 224 C-PLASTIC PELLETS 18 STEARIC ACID 62 PARAFIN 62 SAME 63 SAME 64 SAME 65 S	13 20MS 0.105 19 20MS 0.105 19 0.12 19 0.13 19 0.175 19 0.175 19 0.175 19 0.175 19 0.185 19 0.185 19 0.185 19 0.185 19 0.185 19 0.185 19 0.185 19 0.185	0.037 0.039 0.043 0.043 0.043 0.032	1.117 0.916 0.916 0.964 1.117 3.383 2.906 2.207 2.207 8.512				
64 LOADING 38 STEARIC ACID 64 PARAPEIN OIL 224 C-PLASTIC 64 LOADING 38 STEARIC ACID 64 PARAPEIN OIL 224 C-PLASTIC PELLETS FROM CR 256 SAMPLE 256 SAMPLE 256 SAMPLE C-PLASTIC PELLETS FROM CR 256 SAMPLE C-PLASTIC PELLETS FROM CR 256 SAMPLE 256 SAMPLE C-PLASTIC PELLETS FROM CR 256 SAMPLE 256 SAMPLE 257 SAMPLE C-PLASTIC C-PLASTIC PELLETS FROM CR 257 SAMPLE C-PLASTIC C-PLASTIC PELLETS FROM CR 257 SAMPLE C-PLASTIC PELLETS FROM CR 18 STEARIC SAMPLE 330 CAPOW L33 H 13 STEARIC SAMPLE 330 CAPOW L33 H 13 STEARIC SAMPLE 330 CAPOW L33 H	2 TONS 0.105 1.00.13	0.037 0.039 0.043 0.043 0.032 0.032	1.117 0.896 0.916 0.964 1.363 2.006 2.207 2.207 8.512				
31 STEARIC ACID 61 PARAFIN OIL 224 C-PLASTIC 62 LOADING 32 STEARIC ACID 62 LOADING 33 STEARIC ACID 62 PARAFIN OIL 224 C-PLASTIC PELLETS FROM CR 254 SAMPLE 255 SAMPLE C-PLASTIC PELLETS FROM CR 256 SAMPLE C-PLASTIC PELLETS FROM CR 256 SAMPLE C-PLASTIC PELLETS FROM CR 256 SAMPLE C-PLASTIC PELLETS FROM CR 257 SAMPLE C-PLASTIC PELLETS FROM CR 62.19,93 LAMI 65.4 CR 62.19,93 LAMI 65.4 CR 62.22,93 LAMI 65.5 CR 82.5 CR 82.5 CR 82.5 CR 82.5 CR 82.5 CR 82.5 CR 83.5 CR	0.103 0.103 0.12 0.12 0.275 0.275 0.210 0.210 0.210 0.210 0.210 0.210 0.210 0.210	0.013 0.013 0.013 0.013 0.013	0.916 0.916 0.964 3.383 2.207 2.207 5.512				
61 PARAPEIN OIL 224 C-PLASTIC 224 C-PLASTIC 62 LAADING 33 STEARIC ACID 63 PARAPEIN OIL 224 C-PLASTIC PELLETS HHHHHHHHHHHHHHHHH 02/18/93 LAMIN 62/18/93 LAMIN 63/18/93 LAMIN 63/18/	1 0.1 0.12 1 0.12 3 TONS 0.275 0.210 0.210 0.210 0.210 0.350	0.043 0.043 0.032 0.032	0.316 0.964 0.964 3.383 2.000 2.207 3.207 8.512				
63 PARAPPIN OIL 224 C-PLASTIC 24 C-PLASTIC 35 STEARIC ACID 63 PARAPPIN OIL 224 C-PLASTIC PELLETS HHHHHHHHHHHHHH 02/18/93 LAMIN 03/18/93 LAMIN 02/18/93 LAMIN 18 PARAPPIN 18 STEAMIN SAIL	10.1 10.12 10.12 3 TONS 0.275 0.210 0.210 0.210 0.200 0.200 0.350	0.043 0.649 888888888 0.032 0.033	0.516 0.964 1.064 1.086 2.086 2.207 2.207 8.512				
221 C-PLASTIC PELLETS HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH	12 00.12 3 7005 3 7005 0 .275 0 .210 0 .210 0 .205 1 7005 1 7005 0 .350	0.049 0.032 0.033	3.343 2.946 2.594 2.207 3.207 5.512				
######################################	3 TONS 0.275 0.275 0.210 0.105 0.185 0.185 0.185 0.350	9.032 0.032 0.033	3.343 2.000 2.504 2.207 3.207 5.512				
02/17/93 LANIE 02/17/93 LANIE 08 PARAFEIN OIL 22 C-PLASTIC PELLETS HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH	3 TONS 0.275 0.175 0.210 0.165 110111111111111111111111111111111111	0.032 0.033 0.033	3.383 2.006 2.507 2.207 5.512				
02/17/93 LANER 68 PARAFEIN OIL 22 C-PLASTIC PELLETS HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH	1 TONS 0 .275 0 .175 0 .185 0 .185 1 TONS 0 .350	0.032 0.033	3.343 2.006 2.504 3.207 3.207 5.512				
STEARIC ACID 68 PARAPEIN OIL 224 C-PLASTIC PELLETS HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH	0.175 0.175 0.210 0.185 0.185 1 TONS 0.350	0.032 0.033	5.512 5.512				
68 PARAFEIN OLL 224 C-PLASTIC PELLETS HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH	0.175 0.210 0.185 0.185 0.350	6.033	2.504 2.507 2.207 111111111111111111111111111111111111				
63 PARAFFIN OIL 224 C-PLASTIC PELLETS BEHEFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF	0.185 0.185 1186401111111111111111111111111111111111		2.207 Billibili				
22 C-PLASTIC PELLETS PELLETS FROM CE 25G SAMPLE 32,19,93 LANI 85.4 CHASTIC PULLETS BREEFFROM MAP 62,19,93 LANI 62,2,93 LANI 62,5.4 CHASTIC PULLETS BREEFFROM MAP 32,2,93 LANI 82,5.4 CAPOW L33 H 13. STEAMEC SAIL 330. CAPOW L33 H 14. STEAMEC SAIL 330. CAPOW L33 H 15. STEAMEC SAIL 350. CAPOW L33	11000 0 1100 0 1100 0 1 1 1 1 1 1 1 1 1	20.0	5.512				
227 C-PLIASTIC PELLETS HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH	8 TORS 0.350		5.512		700000000000000000000000000000000000000		
######################################	11111111111111111111111111111111111111		3.512				
02/18/93 LANIN 02/18/93 LANIN 03/18/93 LANIN 25G SAMPLE 25G SAMPLE 25G SAMPLE 25G SAMPLE 02/19/93 LANI 03/19/93 LANI 13. FARAFIN 13. STEANIC SAIL	# 1018 8 1018 0 350						
02/18/93 LANIN 05. 02/18/93 LANIN 25. SAMPLE 25. SAMPLE 02/19/93 LANIN 03/19/93 LANIN 03/19/93 LANIN 03/19/93 LANIN 03/19/93 LANIN 13. PARAFIN 13. STEANING WILL 14. STEANING WILL 15. STEANING WILL 15. STEANING WILL 16. STEANING WILL 17. STEANING WILL 17. STEANING WILL 18. STEANING W	_		5.512				
FROM CONTROLLETS 25G SAMPLE C-PLACYLC PELLETS 62/19/93 LAMI 634 C-PLACYTIC PELLETS C-PLACYTIC PELLETS 62/19/93 LAMI 62/19/93 LAMI 62/19/93 LAMI 62/19/93 LAMI 62/19/93 LAMI 62/19/93 LAMI 63/19/93 LAMI 13/19/19/19/19/93 LAMI 13/19/19/19/93 LAMI 13/19/19/93 LAMI 13/19/19/93 LAMI 13/19/93/93 LAMI 13/19/93/93/93/93/93/93/93/93/93/93/93/93/93	0.350		5.512				
FROM CAPELETS C-PLACTIC PELLETS 02/19/93 LANT 02/19/93 LANT 65% CAPACTIT PELLETS C-PLACTIT PELLETS 02/19/93 LANT 65% CAPOM HARP 02/22/93 LANT 65% CAPOM L33 H 1% STEARIC WILL 30% CAPOM L33 H 1% STEARIC WILL 30% CAPOM L33 H		0.025					
C-PLASTIC PELLETS 102/19/93 LANT 102/19/93 LANT 103/19/93 L							
C-PLASTIC PELLETS 02/19/93 LAMI 05% 02/19/93 LAMI 05% 02/19/93 LAMI 18 PRAMFIN 18 STEANIC WILL 1							
######################################							
02/19/93 LANT 854 HANDCOMPOUNDED C.PLACTIV PELLETS PELLETS 02/19/93 LANT 654 SHEET FROM MUP 02/19/93 LANT 62/22/93 LANT 02/22/93 LANT 02/22/93 LANT 12.5% (MTP 33. PARAFIN 33. CAPOW L33. H 13. STEANIG WILL 30. CAPOW L33. H		*************		***************************************	***********	***************************************	70777777777
854 HANDCOMPOUNDED C.PLACTIV PELLETS PERLETS 02/19/93 CANT 854 C-PLACTIV: PELLETS SHEEF FROM MRP 02/22/93 CAPOW L33 H 1% STEAMED WATER 1% STEAMED WATER 30% CAPOW L33 H 1% STEAMED WATER 30% CAPOW L33 H 1% STEAMED WATER	/1088 /1088				,		
C. PLASTIC PELLETS PERBERRER PELLETS PELLETS 02/19/93 LAM 623 SHEET FROM MAN SHEET FROM MAN 02/22/93 LAM 82.5% (CAPOW L33 H 1% STEAMED WILLS 334 CAPOW L33 H	2 4	950	910	7.	042	1.187	47.847
C-PLASTIC PELLETS. PELLETS. 02/19/93 LANI 03/19/93 LANI 653 MARCHISTER FROM MAN C-PLASTIC PELLETS 18. PARAFIN 13. PARAFIN 13. STEAMED WILL	0.205	0.043	1.177	.32	. 045	2.406	49.160
C.PLACTIC PELLETS. PELLETS. 02/19/93 LANI 654 CANI 654 CANI 652 CANI 6272/93 LANI 6272/93 LANI 82.54 CANI 13. STEAMED WHERE 13. STEAMED	245	9.42	2 2 2 2	;	•		
######################################			. 666				
C-PLASTIC PELLETS C-PLASTIC PELLETS C-PLASTIC PELLETS C-PLASTIC PELLETS C2.22/93 LAMI 02/22/93 LAMI 02/22/93 LAMI 02/22/93 LAMI 12.55 (FFE) 13. PARAFIN 13. STEANIC WILL 14. STEANIC WILL 15. STEANIC WILL							
02/19/93 LANI 653 SHEET FROM HRP C-PLASTIN: PELLIETS 81, PARAFIN 92, 53 32, PARAFIN 13, CAPOW L33 H 13, STEANIC WILL 130°C CAPOW L33 H 13, STEANIC WILL 130°C CAPOW L33 H							100000000000000000000000000000000000000
SHEET FROM MAC SHEET FROM MAC C-PLASTIC: PELLISTS 82.52.93 LAMI 82.53 (MEN) 34. PARAFIN 304 CAPOW L33 H 13. STEANIC: WILL 304 CAPOW L33 H							
SHEET FROM MAIN C-PLACTIC PULLETS 1818888888888888888888888888888888888	000	300	7.0. 7	W 900	6 643	•	368 411
						70.00	111
02.22/93 LAM 02.53 (MARTIN 30. CAPOW L33 H 13. STENRIC WILL 30. CAROW L33.H	마음 마			*********			
13. PARAFIN 30. CAPOW L33 H 12. STEARIC WILL 30°C CAPOW L33. H							
30 CAPOW L33 H 13 STENRIC WILL 30 CAPOW L38. H	0.300	0.018	6.562				
1303 CAPOW L33 H 13. STENRIC WILL 1303 CAPOW L38. H	0.500	0.026	1.571				
	0.530	0.026	1.025				
		0.026	6.057				
C-PLASTIC PELLETS							
				.000000000000	400000000000		100000000000000000000000000000000000000
中国的主义的,这个人,也是一个一个人,也不是一个人,也是一个人,也是一个人,也是一个人,也是一个人,也是一个人,也是一个人,也是一个人,也是一个人,也是一个人,也是一个人,也是一个人,也是一个人,也是一个人,也是一个人,							
23/93	_		;				- 1
851 154-1A(14)	0.580	0.028	6.155	0.740	820.0	10.40	27.50

SAMPLE NO.	DATE	HATERIAL COMPOSITION	RESISTANCE (ORK) BEPORE	THICKESS (INCH) BEFORE	RESISTIVITY (OBS-CN) MEPORE	RESISTANCE (ONI) AFTER	THICKNESS (THEORY)	CONF-CR)	2000 C
	W/ 18 CAPON 138/H								3
6 1% CAPON	34 PARAFTIN	154-3A(34) 154-4A(34)	0.400	0.027	4.010	6.570 6.430	0.020	5.836	45.56
	C-PLASTIC PELLETS)	000000000000000000000000000000000000000
158A	02/25/93								
	85% CHEKANE WASH	165-11	091 0	AF0.0	1.853	9.200	0.035	103.487	5485.714
WITH MEXAME	WITH HEXAME C-PLASTIC PELLETS	155-2A	0.155	0.034	1.795	9.400	.034	100.047	9964.516
NO CAPON							1999999999	100000000000000000000000000000000000000	
156A 156A									
	SAME AS 858	41 751	9	900	199				
String Prope	PELLETS PROM	156-28	0.4.0	0.026	7.268				
I	C-PLASTIC PELLETS								
1916198818181 157A	#888##################################	= 5							
1		0.031" SHIMS	9		776 -	676	150 0	12 183	215 59
.58 CAPOW	85% MEABIC ACID	157-18(18)	0.235	0.030	3.084	0.420		5.512	22.23
							•	90	117 13
	3% PARAFFIN OIL	157-31(38)	0.310	0.031	1.95/	9.476		707.7	21.16
	C-PLASTIC PELLETS		0.213		779.7	0.5.5			
1518									
	•	0.031" SHIMS							
.3% CAPOW	858	158-14(11)	0.235	0.039	2.372				
GRID PATTERN	14 STEARIC ACID	158-2A(11)	0.210	210.0	1.969				
LAMINATE	3% PARAFFIR OIL	158-34(38)	0.230	0.039	2.323			ن	
	C-PLASTIC PELLETS	158-48(38)	0.245	0.039	2.473			-	
	*PARAFFIN LAMINATE				je.				
	GIVE OF WORK								
	17年17年17日日日本日本日本日本日本日本日本日本日本日本日本日本日本日								
139A	05/08/93	159-1A(STABILITY)	0.380	0.073	2.049	€		T	•
LAMINATE	82.5E LOADING	159-2A(BATTERY)	0.400	9.00	1.631				
FOR 4V	. 354. CAPON	159-1A(STABILITY)	0.420	9.086	1.923	•	- -		•
BATTERY	Service Control of Control	150 -4A(BATTERY)	0.3/0)	7.0.1				
	元代年代以北京東京教教会会会会会会会会会会会会会会会会会会会会会会会会会会会会会会会会会会					***********			
160A	03/08/93		!				••		S 70
		O-IA(STABILITY)	0.740	0.085	3.428		-		9
LAMINATE	80% LONDLING		0.810	. 	3.891	-		•	-
NA TOR	who is:	100-3A(BATTERY)	0.670	0.084	3.140				
		200000000000000000000000000000000000000	AC 2 A	710 0	2 600				

Column C	REVISED-	05-APR-1993			STABILITY	TESTING				
1414 1414	SAMPLE NO.	DATE	MATERIAL COMPOSITION	RESISTANCE (ORM) BEPORE	THICKNESS (INCH) BEPORE	NESISTIVITY (OWI-CH!) HEFORE	RESISTANCE (CORT) AFTER	THICHESS (THCH) ATTER	(COM-CR)	
1.00 1.00	1612	000000000000000000000000000000000000000	CANTENSES 225F/3TORS					***************************************		1000000000
Column C		SAN COADTING	141-141 050")	987.	250	5	• • •	3	•	74 282
STATE Control of the control of	4 35 B	.024" 6 .050	161-2A(.050")	0.620	0.054	4.526				
Comparison Com	PROF THE	EXTRODED 13-BOUSE		•		;				
13.2 13.4 13.4 13.5	EXTROCK	:		0.580	0.035	6.524				
14.34		C-PLASTIC PELLETS	161-4A(.025")	0.620	6.037	6.597	s. 45	- 636	22.X2	766.948
STATION STAT										
15.24 1.25	47.1		162-18	***	660.0	Y GUC	13 AAA	•	771 171	2124 243
SAME Compare Compare		Ì	V1-201		0.032	96.	78.0		107-527	23.43.64
1.17.23 C-PLASTIC PELLETS 160-10, 0.305 0.4150	THE SAMELE	PART SEC	47-701			2.6	1.53		20.11	777
151A 01,2243 LANGENT 1329/37008 153-1A 0.550 0.037 10.321 1.000 0.035 677.144 919.771 151A 07,2473 LANGENT 1329/37008 151A 0.57473 LANGENT 1329/37008 151A 0.72473 LANGENT 1329/37008 151A 1.000106 1.00010	3/17/93	C-PLASTIC PELLETS		0.540	0.032	6.64				
15.00 1.00	1638	######################################	CANTENET 325F/3TORS						***************************************	
STATE STAT			;			;		7.7		
FROM SECTION 15 15 15 15 15 15 15 1		SAMPLE EXTRUDED	163-1A	200	0.657	10.321			700 227	
154A	HOUSE	56/41/6								
SECTION STATE SECTION STATE	extrader 19691111111111111111111111111111111111	C-PLASTIC PELLETS 19888988868888888 03/22/93	CANTRACE 325F/3 TORS							
C-PLASTIC MELLETS	154	RECEIVED 3/19/93	164-1A	0.550	0.032	6.767	18.500	0.031	234.950	3372.141
163A 03/22/93 LANDRES 165-1A 0.400 0.032 9.443 0.440 0.031 19.206 1.333 1.333 1.344793 LANDRES 165-1A 0.400 0.032 9.443 0.440 0.031 19.206 1.333 1.335	100 Umas	C. Dr Acette Berrere					Pac-c+		27.727	
100/110/120/120 165-1A 0.400 0.032 9.443 0.140 0.031 10.236 1.333 1.333 1.334	165A	03/22/93	CANTRACK 325F/3 TORS		•••••					
3/22/93 .353 CAPON 165-2A 0.780 0.031 9.966 0.700 0.030 10.235 1.333 C-PLASTIC PELLETS (-PLASTIC PELLETS 166A 03/23/93 LANIMATE 325/3 TOMS EXTRUDED 05/10A/10A/125 1.51 CAPON 0.739 5.956 0.700 0.839 7.667 3.714 16 A 10 A	EXTRUDED	85% LOADING	165-1A	0.800	0.032	9.843	0.540			1.307
C-PLASTIC PELLETS 166A 03/23/93 LANGMARE 3256/3 YORS EXTRUDED 151 LANDING 166-1A 0.590 0.039 5.956 0.700 0.039 7.666 18.644 3/23/93 .351 CAPON 1.65 A 0.700 0.039 5.956 0.700 0.039 7.657 5.714 16 PLACTIC PLIATS C PLACTIC PLIATS C PLACTIC PLIATS EXTRUDED 651 LANDING 167-1A 0.730 0.036 7.993 167A 03/24/93 .355 CAPON L36/A 167-2A 0.720 0.036 7.993 100/105/105/105 100/105/105/105	3/22/93	.35% CAPON 100/110/120/125	165-2A	0.780	0.031	9.96	•.79	.03	16.236	1.333
EXTRUDED 151 Inabins 166-1A 0.590 0.039 5.956 0.700 0.039 7.066 18.644 3/23/93 .351 CAPON 166-2A 0.700 0.039 5.956 0.700 0.039 7.066 18.644 3/23/93 .351 CAPON 201010101010101010101010101010101010101	1664 1664	C-PLASTIC PELLETS HODDON PROPERTY 03/23/93	SPERIOR STATEMENT TORS		*****				***********	***************************************
3/23/93 .351 CAPON 166 2A 0.700 0.038 7.252 0.746 0.036 7.667 5.724 19	CALBIDED	DAT COADING	146.18	085 0	9.0	980 5	900.	910	7,666	11.644
11 STEARIC A-19 100/110/125 C FLACTIC FLIALTS 167A 03/24/93 LANGARE 329F/3 TOMS 167A 03/24/93 - 354 CAPOR L36/H 167-2A 0.820 0.839 0.270 167/93 .354 CAPOR L36/H 167-2A 0.820 0.839 0.270	3/23/93	.351 CAPON	166 2A	0.700	0.036	7.252	. 74	0.036	7.647	5.714
C FIACTIC PELLITTS 167A 01/24/93 LANGRATE 329F/3 TONS EXTRUDED 65% LOADING 167-1A 0.730 0.036 7.903 3/24/93 .35% CAPON L36/H 167-2A 0.820 0.039 6.270		31 STEARIC ACID 100/110/120/125								
167A		C PIALTIC PELLETS								
851 LOADING 167-1A 0.730 0.036 .35% CAPUM L38/H 167-2A 0.820 0.039 100/105/105/105	167A 167A	86/72/50	CANTRACE 329F/3 TORS							
.35% CAPOW L38/H 167-2A 6.820 6.039 100/105/105/105	EXTRUDED	851 LOADING	167-1A	0.730	0.036	7.983				
	3/24/93	.35% CAPON L38/H 100/105/105/105	167-2A	0.820	6.039	1.278				

C-PLASTIC PELLETS

100-10 1.200 1.000 1.000-10 1.000-	NEVISED-	06-MAY-1993		v 1	STABILITY TESTING	STING				
13.74.73 13.74.000 144-1.14 1.200 1.	SAMPLE NO.	DATE	HATERIAL COMPOSITION	RESISTANCE (OHN) BEPORE	THICKNESS (INCN) BEFORE	RESISTIVITY (ORM-CH) BRPORE	RESISTANCE (OBI) AFTER	THICHESS (INCH) ATTER	MESISTIVITY (OMI-CH) AFTER	PERCENT CRUMEN (3)
853 LOADING C-PLASTIC PELLETS 19726/93 LAN 653 LOADING .354 CAPON L30/H C-PLASTIC PELLETS 1914119111111111111111111111111111111	EXTRUDED 3/24/93 VARYING TEMP.	85% LOADING .35% CAPOW L36/N 10% PARAFFIR OIL C-PLASTIC PELLETS HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH	169-1A 100/115/120/125 168-2A 100/110/120/125 166-1A 100/110/115/115 MURATE 325/3 TONS	1.200 IR too high. Lamination stopped.		0 0 0 0 0 0 0 0				
EXTREMENDED 17.6 A.73 A.73 A.73 A.73 A.73 A.73 A.73 A.73	EXTRUDED 3/25/93	85% LOADING NO CAPOM/ADDITIVES	169-1A 1 69- 2A	0.890	0.041	8.546 4.993	>100 >100			
170 170	HIGH TEMP 11019111111111111111111111111111111111	C-PLASTIC PELLETS HITHIUM HITHIUM 03/26/93 L								
HIGH TEAP C-PLACETIC FELLETS HIGH TEAP	EXTRUDED 3/26/93	85% LOADING .35% CAPOW L38/H	170-1A 170-2A	0.600	0.041	6.530	0.660 0.860	0.041	6.338	-2.941 -4.404
National Principle Nationa	HIGH TEMP 1966618989 171A	C-PLASTIC PELLETS 03/30/93 L			****					
National Prince National P	AR .	851	171-1A	0.350	0.035	3.937	0.740	0.035	8.324	111.429
17.25/29 PELLETS FROM 171-3A 0.550 0.039 5.639 5.639 171-1A	RECEIVED	VACUUM PRESSED	171-2A	0.680	0.035	7.649	1.050	0.036	11.463	50.123
C-PIASTIC PELLETS	3/25/93	PELLETS FROM	171-3A	0.520	0.039	5.249				
EXTRUMED 653 LANGINGE 3256/3 TORS EXTRUMED 653 CAPON L34/11 172-2A 0.560 0.045 4.024 0.590 0.045 1. 6 3/31/93 3.54 CAPON L34/11 172-2A 0.560 0.045 4.024 0.590 0.045 1. 6 3/31/93 3.54 CAPON L34/11 173-2A 0.340 0.039 3.432 0.360 0.040 3 4/2/93 3.54 CAPON L34/11 173-2A 0.410 0.039 1.432 0.360 0.040 3 4/2/93 3.54 CAPON L34/11 173-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 3.54 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 3.54 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 3.54 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 4.139 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 0.410 0.039 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 0.410 0.039 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 0.410 0.039 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 0.410 0.039 0.400 0.040 3 4/2/93 4.354 CAPON L34/11 174-2A 0.410 0.039 0.410 0.039 0.400 0.040 0.040 0.040 0.040 0.040 0.040 0.040 0.040 0.040 0.040 0.040 0.040 0.0	•	C-PLASTIC PELLETS	VI-1/1	0.550	0.03					
172-13 172-13 172-24 0.560 0.045 4.024 0.530 0.045 4.024 0.530 0.045 4.024 0.045 4.024 0.045 4.024 0.045 4.024 0.045 4.024 0.045 4.024 0.045 4.024 0.045 4.024 0.045 4.024 0.045 4.024 0.045 4.024 0.045 4.024 0.045 4.024 0.045 4.024 0.045 4.024 0.045 4.024 0.045 4.024 0.045 4.024 0.045 4.024 0.045 0	172A	18444444444444444444444444444444444444	BEEFFEFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF							
131/93 .354 CAPON L34/11 172-2A 0.560 0.045 4.199 0.500 0.045 1.6 1.00/130/150/160 1.00/130/150/160 1.00/130/150/160 1.00/130/150/160 1.00/130/150/160 1.00/130/150/160/180 1.00/130/130/130/130/130/130/130/130/130/1	EXTRUDED	851	172-1A	0.460	0.045	4.024	0.530	0.045	4.637	15.217
HIGH TEMP C-PLASTIC PELLETS EXTRUDED 651 LANGACE 325F/3 TORS 4/2/93 .354 CAPON L36/11 173-2A 0.410 0.039 3.432 0.360 0.040 3 4/2/93 .354 CAPON L36/11 C-PLASTIC PELLETS C-PLASTIC PELLETS HIGH HIGH HIGH HIGH HIGH HIGH HIGH HIG	3/31/93	.35% CAPON L38/11 100/130/150/160	172-2A	0.560	9.048	1.89	0.90	.045	. 6.999	42.857
### 173-1A	HIGH TEMP 1999999999999999999999999999999999999	C-PLASTIC PELLETS HITTERNITHENSINES 04/2/93 L								
4/2/93 .354 CAPON L36/H 173-2A 0.410 0.039 4.139 0.400 0.048 4.139 100/140/160/180 100/140/160/180 173-2A 0.410 0.039 4.139 0.400 0.048 4.139 0.400 0.400 0.048 4.139 0.400 0.400 0.040 3.134 CAPON L36/H 174-1A 0.410 0.039 4.139 0.400 0.400 0.040 3.134 CAPON L36/H 174-1A 0.428 0.439 4.139 0.400 0.000 3.134 CAPON L36/H 174-2A 0.428 0.430 4.139 0.400 0.000 3.134 CAPON L36/H 174-1A 0.428 0.430 4.139 0.400 0.000 3.134 CAPON L36/H 174-1A 0.428 0.430 4.139 0.400 0.000 3.134 CAPON L36/H 174-1A 0.428 0.430 0.430 0.430 0.000 3.134 CAPON L36/H 174-1A 0.428 0.430 0.430 0.430 0.000 3.134 CAPON L36/H 175-1A(160) 0.550 0.041 5.281 0.790 0.430 0.041 7	Country		177.18	070	920	1 413	97. 0	676	1 541	316
C-PLASTIC PELLETS 174A 04/3/93 LANIMATE 325F/3 TONS EXTRUDED 851 CAPON L32A1 174-1A 0.410 0.039 4.139 0.400 0.040 3. 4/2/93 .354 CAPON L32A1 174-2A 0.425 0.439 4.139 0.400 0.040 4. C-PLASTIC PELLETS C-PLASTIC PELLETS 100/160/140/1911111111111111111111111111111111	4/2/93	.354 CAPON L36/II 100/140/160/180	173-2A	0.410	0.039	4.139	0.0		7.69	11.362
	174A	C-PLASTIC PELLETS HUMBHIHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH	HITTERSTREES 325F/3 TORS	*****						***************************************
	EXTRUDED 4/2/93	354 CAPON L34/11 100/160/140/200	174-1A 174-2A	0.410	0.039	4.139	0 · 400 0 · 450	0.0	3.937	4.67
		C-PLASTIC PELLETS								
853 CONTROL 175-1A(160) 0.550 0.041 5.281 6.790 6.041	175A	04/05/93								
	EXTRIDED	154	175-14(160)	0.550	0.041	5.281	0.790	0.041	7.506	43.636

	DEFORE (OFFE) DEFORE 0.390 0.470 0.440 0.420 0.420 0.420 0.380 0.400 0.380 0.400 0.400 0.400 0.380 0.400	0.042 0.043 0.043 0.040 0.040 0.039 0.039 0.039 0.041 0.043 0.043 0.043	(OMP-CH) (OMP) 3.656 0.530 4.303 0.660 4.303 0.600 4.134 0.430 4.134 0.430 4.134 0.430 3.636 0.390 3.636 0.390 3.636 0.390 3.636 0.390 3.636 0.390 3.636 0.390 3.636 0.390 3.636 0.390 3.636 0.390 3.636 0.390	0.530 0.530 0.530 0.530 0.330 0.330 0.330 0.330 0.330 0.330 0.330 0.330	0.042 0.043 0.043 0.043 0.043 0.044 0.044 0.044 0.044 0.044 0.044 0.044	4.968 4.968 4.968 5.226 5.236 5.310 4.232 4.705 1.937 1.937 5.009 6.937 5.009 5.009 5.009 5.009	35.87 35.87 35.83
	0.470 0.470 0.420 0.420 0.380 0.380 0.350 0.350 0.350 0.350 0.350 0.350 0.350 0.350	0.042 0.043 0.040 0.040 0.039 0.041 0.041 0.043	3.656 4.303 4.134 4.134 4.134 4.134 5.857 5.857 7.200 9.614 7.216	0.530 0.660 0.300 0.430 0.300 0.300 0.710 0.710	0.042 0.043 0.044 0.044 0.041 0.041 0.041 0.042 0.042	4.366 6.226 8.310 4.232 4.705 3.937 3.937 8.009 6.937 7.214 8.951	2. 31 2. 32 2. 33 2. 53 2. 53
	0.470 0.420 0.420 0.380 0.380 0.380 0.350 0.350 0.350 0.350 0.350 0.350 0.350	0.043 0.043 0.040 0.040 0.040 0.041 0.043 0.043	4.303 4.124 4.134 4.134 4.134 5.857 5.857 7.240 9.614 7.516	0.650 0.130 0.130 0.130 0.130 0.130 0.770 0.770	0.043 0.043 0.041 0.039 0.041 0.042 0.042	6.226 5.310 4.232 4.705 3.937 3.937 5.009 6.937 7.214 5.951	4.661 2.73 2.30 2.632 -2.26 -1.315
	0.470 0.440 0.420 0.350 0.350 0.350 0.350 0.350 0.350 0.350 0.350 0.350 0.350 0.350	0.043 0.040 0.040 0.039 0.039 0.041 0.043 0.043	4.303 4.124 4.134 4.623 3.626 3.626 3.626 3.626 3.626 3.626 3.626 7.246	0.430 0.430 0.330 0.330 0.330 0.740 0.770 0.659	0.043 0.044 0.044 0.041 0.042 0.042	6.226 5.310 4.232 4.705 3.937 3.543 5.049 6.937 7.214 5.951	2.30 2.632 2.632 2.632 -2.266 -2.266
	0.440 0.420 0.420 0.300 0.350 0.350 0.350 0.350 0.350 0.420 0.420 0.420 0.420 0.420 0.420	0.040 0.039 0.039 0.041 0.043 0.043 0.043	5.626 3.036 3.036 3.626 3.626 7.246 9.614	0.430 0.390 0.390 0.390 0.740 0.770 0.770	6.042 6.042 6.042 6.042 6.042 6.042	4.232 4.302 4.303 3.937 3.649 6.937 5.049 6.937 5.951	2.301 -2.439 2.632 -2.286 -1.286
그 유럽 전투한 경험 경험 유	0.420 0.420 0.30 0.30 0.350 0.350 0.350 0.350 0.350 0.350 0.350 0.350 0.350 0.350	0.040 0.040 0.039 0.039 0.041 0.041	4.134 4.134 4.825 3.836 3.626 3.626 7.240 9.614 7.240	0.430 0.430 0.330 0.330 0.330 0.770 0.770	0.044 0.044 0.042 0.042 0.042	4.232 4.705 1.937 3.937 3.943 6.937 5.049 6.937 5.951	2.30 2.632 2.632 2.362 2.363 4.363
	0. 420 0. 420 0. 420 0. 380 0. 380 0. 350 0. 350 0. 490 0. 490	0.040 0.039 0.039 0.041 0.043 0.043	4.134 4.823 3.626 3.626 5.857 7.268	0.430 0.390 0.390 0.390 0.770 0.770	0.044 0.039 0.039 0.041 0.041 0.042	4.232 4.705 3.937 3.543 6.937 6.937 5.069	2.301 2.632 -2.206 -2.206
	0.420 0.490 0.380 0.350 0.350 0.610 0.610 0.810 0.840	0.040 0.039 0.039 0.041 0.043 0.043	4.134 4.625 3.626 3.626 3.626 7.240 9.614 7.240	0.430 0.330 0.330 0.530 0.770 0.770	0.039 0.041 0.042 0.042	4.232 4.705 3.937 3.543 5.049 6.937 7.234 5.951	2.03 2.03 2.03 2.03 2.03 2.03 2.03 2.03
	0.350 0.350 0.350 0.350 0.350 0.610 0.610 0.810	0.040 0.039 0.041 0.041 0.043	5. 857 7. 246 7. 316	0.130 0.330 0.330 0.530 0.770 0.770	0.033 0.033 0.042 0.042	4.705 3.937 3.543 5.009 6.937 5.009 5.909	2.62 2.26 2.26 2.26 2.26 2.26 2.26 2.26
	0.380 0.380 0.350 0.350 0.610 0.810 0.840 0.840	0.039 0.038 0.041 0.041 0.043 0.044	3.836 3.626 3.626 5.857 7.246 7.316	0.390 0.360 0.530 0.770 0.650	0.039 0.042 0.042 0.042	3.543 3.543 5.069 6.937 5.053 6.937	2.632 -2.206 60066666
	0.350 0.350 0.350 0.510 0.610 0.810 0.840	0.039 0.041 0.041 0.043 0.044 0.044	3. 626 3. 626 3. 626 7. 246 7. 516	6.530 6.740 6.770 6.650	0.042 0.042 0.042	3.543 5.069 6.937 7.238 5.951	-13.113
	DESCRIPTION OF STORY	0.041	5. 857 7. 248 9. 614 7. 516	0.530 0.740 0.770 0.650	0.041 0.042 0.042 0.042	5.009 6.937 7.234 5.951	-13.13
	0.610 0.610 0.810 1.050 0.840 0.840	0.041	5. 857 7. 240 9. 614 7. 516	0.530 0.740 0.770 0.650	0.041 0.042 0.042 0.042	5.009 6.937 7.216 5.951	11: E1-
	0.610 0.810 1.050 0.840 0.840	0.041	5.857 7.240 9.614 7.516	6.536 6.746 6.656		5.069 6.937 7.218 5.951	-13.11
	0.810 1.050 0.840 6.840 6.840 6.840 6.840 6.840	0.004 0.004 0.0043 0.0044	7.246 9.614 7.516	6.746 0.770 6.656		5.218 5.218 5.951	7
	1.050 0.840 6.840 4.8688888888888888888888888888888888888	0.043	9.614	0.770	9.042 9.043	7.218 5.951	7
	1.050 0.840 6.840 4.8688888888888888888888888888888888888	0.043 0.044 0.044	7,516	0.650		5.951	-24.92
	0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 -						-X.E.
	· · · · · · · · · · · · · · · · · · ·						
	64664684488448888880 Oes						
	4444444444444 083					***************************************	

_							
-	0.540	0.046	4.622	0.580	0.046	7.00	
_	0.640	0.047	9.361			-	
-	•	•	163.4	977	570 0	4.199	-9.131
_	0.530	0.043	4.321		0.041	1.69	6.667
•							
-							
•		3668666666	10000000000	***********	100000000000	************	
151 CAPON 136/11 100/130/150/160 ENTRUDED 3/31/93	NORS.						
351 CAPON L36/II 100/130/150/160 ETTNUED 3/31/93					:	•	
100/130/150/160 ENTRUDED 3/31/93	0.390	0.045	3.412	0.460	0.045	7.07	
EXTRUDED 3/31/93	0.310	0.043	2.636	6 .330	0.043	3.511	
A 1. 4. 1. 4. 1. 4. 1.		1				1111	21.424
C-PLASTIC 100/140/160/160 1/9-3A(160/	0.280	0.043	2.564			1.03	22.541
	0.310	0.043	7.83				
LAMINATION							
194 C-PLASTIC							
100/140/161/001							
							7000000
	**************	********					
	rons		-				,
109[]4[-01]	0.300	0.041	2.887	0.390	0.042	3.656	% : S

SAMPLE NO.	DATE	MATERIAL COMPOSITION	RESISTANCE (ONH) BEFORE	THICKNESS (INCH) BEFORE	RESISTIVITY (OSSI-CR) REPORE	HESISTANCE (OBN) APTER	(19CS) ATTA	(OBS-CE)	S S S S S S S S S S S S S S S S S S S
AND C-PLASTIC BEFORE	100/130/150/160 100/140/160/180 EXTRUDED 4/5/93	180-3A(180) 180-4A(180)	0.310	0.039	3.129	0.390	0.039	3.236	25.866
IN-HOUSE EXTRUDED	19% C-PLASTIC 100/140/160/160								
181A 181A	C-FLASTIC HERBERTHRENSHIPS 111111 1811A 04/26/93 1	istricistatestestestestestestestestestestestestest		**********		8988888888			••••••
SISTER TO	ă	181-1A(200) 181-2A(200)	0.470	0.063 0.059	2.937	0.560	0.062	3.613	25.395
LANGINASE		181-3A(180)	0.540	0.064	3.322	0.610	0.064	3.752	12.963
IN-HOUSE EXTRUDED	191 C-PLASTIC 100/140/160/180								
182A	=	istaletetetetetetetetetetetetetetetetetete				*********	566666666		*******
TO BATTERIES FOR PASTE	10% PARAFFIR OIL	182-1A(200)	0.680	0.073	3.667				
ADRESTOR STUDIES		SANDED 182-2A(200)	0.700	0.060	4.593				
	Othor so a sor	PD THEN SANDED	0 680	0.071	1.771				
	3117411-3 461	SANDED							
		182-4A(180) Pb THEN SAMDED							
			IR readings taken at sepsessessessessess	taken at corner ###################################	nor of laminato. Hillistitititi	 	************	ii	1000000000
1837	04/29/93	CAMINAT			•		****	•	35 97
		183-1A	0.360	0.043	5.479	0.040		4.511	2
	ř	47-591 46 581			7.5.6		0.059	2.63	44.737
HEXANE WASH	HOAVE SEC.	183-48	0.380	0.057	2.625	0.580	0.059	3.676	47.450
4/29/93	191 C-PLASTIC	***************************************							
	中央の主義の主義の主義の主義の主義の主義の主義の主義の主義の主義の主義の主義の主義の	LAMINATE 3258/3 TORS	**************************************						
	108			0.046	4.964	0.780	9.016	6.676	34.483
	.35% CAPON	184-2A	0.500	0.046	4.279	9.700	0.017	6.701	25.25
IJ	HANDCOMPOUNDED NOT SANDED	164-3A	0.580	0.050	4.567	9.76	.051	5.167	28 . 46 5
	19% C-PLASTIC						1309888888888888888888888888888888888888	166666666666	16666664
105A	05/05/93	LAMINATE 325P/3 TORS	2			648	946	152	52, 632
	82.58 35. China	165-2A	0.350	0.00	2.379	0. 410 0. 410	0.030	3.228	35.724
	HANDCONDOMBDED	THICK SUBSTRATE							

19% C-PIASTIC

SAMPLE NO.	DATE	HATERIAL CONFOSITION	RESISTANCE (ONN) BEFORE	THICONESS (INCH) BEFORE	RESISTIVITY (ORM-CR) METORE	MESISTANCE (CORT) AFTER	THICKNESS (INCH) AFTER	MESISTIVITY (OMI-CH) ATTER	
	854 CAPON .354 CAPON 104 PARAPPIN OIL NOT SANDED	166-1A 186-2A	1.000	0.041	9.602	1.550	. 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	14.529	51.310
	19% C-PLASTIC	######################################							
	O.008" RIBBON	107-1A		0.030	2.034	10.500	0.030	137.795	6674.194
RIBBON	PRESSED ON	107-2A	0.135	0.029	1.033	20.000	0.029	271.518	14714.815
REC' 5/17/93	HAND PRESS	187-3A 187-4A	0.135 0.155	6.629 0.030	1.833 2.034		. 630	106.299	5125. 26 5
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	19% C-PLASTIC								7277777
1008 1008		returner 3307/2 TORS							
	0.010" RIBBON		0.140	0.028	1.969	6.000	0.030	78.740	3900.000
RIBBON	PRESSED ON	100-2A	0.140	0.031	1.778	9.80	0.030	110.110	6542.057
REC' 5/17/93	MAND PRESS	188-3A	6.135	0.03E	1.715		1.0 0	121.920	
	191 C.PLASTIC								
		torenousesousenencescescesousenentercescesousenentercesousenentercesousenentercesousenentercesousenentercesous Fabrikate							
	352 52854	189-1A	0.970	0.045	1.486				
04 / 1 / 03		COL SEN SIGNES NO GI	TOO HIGH MEN S	SAMPLES WILL					
66/11/20	19% C-PLASTIC	169-3A(SANDED)	57	0.051	3.628		0.051	5.404	46.936
			0.540	0.045	4.724	0.830	0.045	7.262	52. 78¢
	をのはできないのはなのである。 と 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					****			
		190-1A	0.740	0.086	3.368				
	.358 CAPON 1.38/11	190-2A	0.780	0.092	3.338				
SUBSTRAIRS		190-3A 190-4A	0.730 0.660	9 9 9 9 9 9	3.342				
EXTRUDED	19% C-PLASTIC	!			<u>}</u>			:	
04/2/93						***********	***********		
1917	10/93	LAMINATE 295F/3 TORS					;	. !	
HUPE	351 CAPON 1.38 AL	191-1A(006)SANDED 191-2A(006)	0.250	0.04	2.237	1.500	7 7	14.316	
SPOOF AND									
20048	191 C-PLASTIC	191-3A(007)SANDED	0.230	0.043	2.106	0.430	0.0	4.295	103.953
	**********	-	=		2	***************************************		*************	
192A	18/93	LAMINATE 295F/3 TORS			•		•		
~	35% CAPON/L38H	192-1A 192-2A	1.300	0.051 0.049	15.266	7. 200 4. 400	0.049	34.646	126.947
HOT PLATE	V-BLENDED 6/1/93								
	19% C-PLASTIC		************			**********	*******		
1934	955	INDIES (757) TURN			•		•		•
æ	. 54 CAPON/L38H	193-1A(SANDED)	0.190	0.062	1.207	0.120	0.062	5.207	331.579
	V-BLENDED 6/1/93	193-2A	0.20	- 62	1.765	7.200	. 634		777-77

194-24 002 0.220 0.421 1.366 1.590 0.422 144.577 194-24 002 0.220 0.422 1.364 0.420 0.422 144.577 194-24 002 0.220 0.422 0.420 0.4	1944 651 661 651 651 651 651 651 651 651 651	************					Ę	N Tark		
C-PLASTIC	1-CKOSS FRO 1-CKOSS FRO 1-CKOS FRO 1-CKOS 191 193 61 194 61 195	724/93				100000000000000000000000000000000000000		••••••••		
13. C-FAZZITI (1912-1) 0.230 0.442 1.150 1	152 OF .001 152 OF .001 153 OF .001 154 OF 154 OF 155 OF	١	194-14(.008")		0.031	3.366	. 500	0.032	104.577	3067.311
131 C-FLASTIC 131 C-FLASTIC 131 C-FLASTIC 132 C-FLASTIC 132 C-FLASTIC 133 C-FLASTIC 134 C-FLASTIC 135 C-FLASTIC 135 C-FLASTIC 135 C-FLASTIC 135 C-FLASTIC 136 C-FLASTIC 137 C-FLASTIC 138 C-FLASTIC 139 C-FLASTIC 130 C-	155 OF .006" 191 HIBSON 194 1955 OF 19		194-2A(.008")	0.320	0.042	3.000	3			
1	194 AND 194 194 195	.010. OW	194-38(.010")	0.290	0.0	2.854	÷			
14. C-FASTIC 15. CANONIS MARINE 205/3 TONS 15. CANONIS MARIN	194 194 194 195 195 195 195 195 195 195 195 195 195	THICK	194-44(.010")	0.310	0.034	3.590	4.90 0	0.034	509.495	14093.548
134 C-FLASTIC 135 C-FLASTI	191 1954 1954 1954 1954 1954 1 CANON SANN BRUNKED LAN									
13	1954 954 964 155 M M M M M M M M M M M M M M M M M M	C-PLASTIC								
154 154 154 154 154 154 154 155	1954 95 854 855 85 15 CATON SANT BRUDED LAN									
STATE LANGE 195-1A 0.460 0.466 1.570 0.466 0.466 1.570 0.466 0.4	S	1/28/93					<u>:</u>	- .	- :- :- :- :- :- :- :- :- :- :- :- :- :-	
1	3	TEN	195-11	0 460	970 0	1 017	957 9	977	13.5	790.57
CAUCHE C			101							
14-33 134 C-PLASTIC			W7-661							
19 C - PLASTICE		AND BEFORE								
14-35 193 C-PLASTIC 10-10-10-10-10-10-10-10-10-10-10-10-10-1		THATION								
191	-16-93									
1.00 1.00		C.DI ACTIO								
Column C										
135 CAPON 136-1A 1.150 0.044 10.290 1.150 0.045 10.651 1.150 0.045 10.200 1.150 0.045 10.200 1.150 0.045 10.200 1.150 0.045 10.651 1.150 0.045 1.150 0.045 1.150 0.045 1.150 0.04	100000000000000000000000000000000000000			~~~~~~~~~						
134 CAPON 136-1A 1.050 0.044 10.200 1.150 0.045 10.061 1.34 CAPON 1.06-1A 1.050 0.045 0.146 1.340 0.045 11.74 1.050 0.045 0.146 1.340 0.045 11.74 1.050 0.045 0.146 1.340 0.045 11.74 1.050 0.045 0.146 1.340 0.045 11.74 1.075 0.045 0.146 0.146 1.340 0.045 11.74 0.045 0.146			LAMINATE 295F/3 TORS				•	-	-	
CANONIC METORS 196-1A 1.150 0.444 10.200 1.150 0.465 11.174	108	LOADING								
CALCADO SANIGED REPORT 196-2A 1.050 0.645 9.166 1.130 0.645 11.374 11.274 11.2450 11.274 11.2450 1.136 1.136 1.1374 11.2450 11.274 11.2450 11.274 11.2450 11.274 11.2450 11.274 11.2450 11.274 11.2450 11.274 11.2450 11.274		A CAPON	196-14	1.150	0.044	10.290	1.150	0.045	10.061	-2.222
19-93 191 C-PLASTIC 191-14111111111111111111111111111111111			46.341	966		70.00				
14-23 191 C-PLASTICA 191-LALIANE 295/3 TORS 192 C-PLASTICA 192-LALIANE 295/3 TORS 193 C-PLASTICA 193-LALIANE 295/3 TORS 194 C-PLASTICA 194 C-PLASTI			V7-961	7.0		2.7.6				
19 C - FLASTIC 19 - Activity 19 - Activi		TINATION								
191 C-PLASTIC 197-AL(13F) 0.240 0.644 2.147 0.700 0.645 0.224 0.645	.16-93									
State 0.00	191	C-PLASTIC								
97-1A(315F) 0.240 0.044 2.147 0.700 0.045 6.124 97-2A(315F) 0.245 0.045 2.046 0.650 0.045 6.207 97-2A(315F) 0.225 0.045 1.969 0.730 0.045 6.207 97-2A(315F) 0.225 0.045 1.969 0.730 0.045 6.207 97-5A(315F) 0.240 0.045 1.959 0.100 0.045 1.207 97-5A(315F) 0.200 0.045 1.925 0.275 0.045 1.207 97-5A(315F) 0.200 0.045 1.925 0.275 0.045 2.525 97-5A(315F) 0.205 0.045 1.712 0.275 0.045 2.406 97-5A(400F) 0.205 0.045 1.712 0.275 0.045 2.406 97-10A(400F) 0.205 0.045 1.712 0.250 0.045 2.406 98-1A(315F) 0.205 0.045 2.423 0.260 0.045 0.045 98-1A(315F) 0.205 0.045 2.423 0.260 0.045 0.045 98-1A(315F) 0.205 0.045 2.305 0.047 0.045 98-1A(315F) 0.205 0.045 2.305 98-1A(315F) 0.205 0.045 2.005 98-1A(305F) 0.205	97A 06	1/29/93	LANIBATE 295P/3 TORS		-			•		: -
197-1A(315F) 0.240 0.044 2.147 0.700 0.045 5.124 197-2A(315F) 0.275 0.045 2.466 0.650 0.645 5.667 197-2A(313F) 0.225 0.045 2.466 0.650 0.045 5.397 197-3A(313F) 0.225 0.045 2.179 0.10 0.045 5.253 197-4A(315F) 0.240 0.046 2.147 0.370 0.045 3.237 197-5A(315F) 0.220 0.045 2.056 0.296 0.045 2.537 197-5A(315F) 0.205 0.045 1.925 0.296 0.045 2.466 197-7A(317F) 0.205 0.045 1.712 0.275 0.045 2.466 197-7A(317F) 0.205 0.045 1.712 0.275 0.045 2.466 197-7A(400F) 0.205 0.045 1.712 0.275 0.045 2.466 198-1A(315F) 0.410 0.040 3.455 0.860 0.049 0.040 198-1A(315F) 0.205 0.046 2.326 1.256 0.040 0.040 198-1A(315F) 0.205 0.046 2.306 0.040 0.040 198-1A(315F) 0.205 0.046 2.306 0.040 0.040 198-1A(315F) 0.206 0.040 2.306 0.040 0.040 198-1A(315F) 0.206 0.040 2.306 0.040 0.040 198-1A(315F) 0.206 0.040 2.202 198-1A(307F) 0.206 0.040 2.202 198-1A(307F) 0.206 0.040 2.202 198-1A(400F) 0.206 0.040 2.202 198-1A(200F)	85%	LOADING								
97-2A(315F) 0.275 0.045 2.066 0.690 0.045 5.067 97-2A(315F) 0.275 0.045 1.969 0.790 0.045 6.253 97-3A(315F) 0.225 0.044 2.147 0.370 0.045 6.253 97-3A(315F) 0.240 0.044 2.147 0.370 0.045 3.237 97-3A(315F) 0.220 0.045 1.925 0.275 0.045 2.466 97-5A(315F) 0.215 0.045 1.925 0.275 0.045 2.456 97-5A(400F) 0.205 0.045 1.712 0.275 0.045 2.456 97-5A(400F) 0.205 0.045 1.712 0.275 0.045 2.466 97-5A(400F) 0.205 0.045 3.226 1.250 0.045 0.045 98-5A(315F) 0.210 0.045 2.421 0.200 98-5A(400F) 0.210 0.045 2.020 98-5A(400F) 0.210 0.045 2.020 99-5A(400F) 0.210 0.045 2.020 99-5A(400F) 0.245 0.045 2.020 99-9A(400F) 0.045 0.045 2.020 99-9A(400F) 0.045 0.045 2.020 99-9A(400F) 0.045 0.045		CAROL	197-18(315F)	0.240	0.044	2,107	900	6. DAS	6.124	185, 185
197-34(135F) 0.225 0.045 1.950 0.130 0.045 0.237 0.240			1210147-101							
197-3A(1357) 0.225 0.045 1.369 0.739 0.645 6.287 197-3A(1357) 0.225 0.044 2.147 0.379 0.316 6.253 1.237 197-5A(1357) 0.240 0.044 2.147 0.379 0.379 0.367 3.237 197-5A(1357) 0.240 0.044 1.327 0.375 0.465 1.237 197-5A(1357) 0.235 0.045 1.381 0.376 0.045 1.237 197-7A(1757) 0.235 0.045 1.381 0.399 0.045 1.381 197-7A(1757) 0.205 0.045 1.794 0.275 0.045 1.406 1.794 0.275 0.045 1.406 1.794 0.275 0.045 1.406 1.794 0.275 0.045 1.406 1.794 0.275 0.045 1.406 1.794 0.275 0.045 1.406 1.794 0.275 0.045 1.406 1.794 0.275 0.045 1.406 1.794 0.275 0.045 1.294 0.275 0.045 1.294 0.295 0.047 1.794 0.296 0.047 1.799 0.340 0.046 1.396 0.340 0.046 1.396 0.340 0.046 1.396 0.340 0.046 1.396 0.340 0.046 1.396 0.340 0.046 1.396 0.340 0.046 1.396 0.340		ALL DELFORE	(3CTC) V7-/6T	C/7.0		7			20.0	
197-4A(335F) 0.360 0.051 2.779 0.010 0.051 6.253 197-5A(35F) 0.240 0.044 2.147 0.376 0.065 3.237 197-5A(35F) 0.220 0.045 1.925 0.275 0.465 3.237 197-7A(375F) 0.235 0.045 1.056 0.290 0.045 2.537 197-7A(375F) 0.205 0.045 1.091 0.206 0.065 2.625 197-9A(400F) 0.205 0.045 1.794 0.775 0.065 2.625 197-10A(400F) 0.205 0.046 1.712 0.275 0.065 2.406 197-10A(400F) 0.200 0.046 1.712 0.275 0.065 2.406 196-1A(315F) 0.430 0.049 3.455 0.860 0.049 6.910 196-1A(315F) 0.430 0.049 3.226 1.250 0.067 6.069 196-1A(315F) 0.430 0.047 2.471 0.206 0.049 6.910 196-1A(315F) 0.200 0.047 2.471 0.206 0.067 6.069 196-1A(315F) 0.200 0.045 2.202 4.006 196-1A(315F) 0.200 0.047 2.471 0.200 0.047 6.069 196-1A(315F) 0.200 0.045 2.202 196-1A(315F) 0.200 0.047 2.202		IIMATION	197-3A(335F)	0.225	. T.	1.969	.73	• . • . • . • . • . • . • . • . • . • .	6.317	77.E
197-5A(355F) 0.240 0.044 2.147 0.379 0.045 3.237 197-5A(355F) 0.220 0.045 1.925 0.275 0.245 2.406 197-5A(375F) 0.235 0.045 2.056 0.296 0.045 2.537 197-7A(375F) 0.215 0.045 1.011 0.306 0.045 2.406 197-7A(400F) 0.205 0.045 1.712 0.275 0.045 2.406 197-10A(400F) 0.200 0.046 1.712 0.275 0.049 2.406 197-10A(400F) 0.200 0.040 3.455 0.860 0.049 6.910 196-1A(315F) 0.410 0.040 3.455 0.860 0.049 0.040 196-1A(315F) 0.295 0.047 2.411 0.260 0.047 0.046 196-1A(315F) 0.295 0.046 1.250 0.046 0.045 196-1A(315F) 0.200 0.046 1.250 0.046 0.040 196-1A(315F) 0.240 0.040 2.423 0.046 0.047 196-1A(375F) 0.240 0.046 2.020 196-1A(375F) 0.240 0.040 2.402 196-1A(375F) 0.240 0.040 2.020 196-1A(375F) 0.240 0.040 2.020 196-1A(375F) 0.240 0.040 2.000 196-1A(400F)			197-4A(335F)	0.360	0.051	2.779	0.110	150.0	6.253	125.000
197-6A(355F) 0.220 0.845 1.925 0.275 0.445 2.406 197-6A(375F) 0.235 0.045 1.915 0.396 0.045 2.525 197-6A(375F) 0.235 0.045 1.911 0.396 0.045 2.406 197-6A(475F) 0.205 0.045 1.712 0.275 0.045 2.406 197-10A(400F) 0.205 0.046 1.712 0.275 0.045 2.406 197-10A(400F) 0.200 0.046 1.712 0.275 0.045 2.406 197-10A(400F) 0.410 0.049 3.455 0.460 0.049 0.040 196-1A(315F) 0.410 0.040 3.425 0.420 0.047 0.420 196-1A(315F) 0.295 0.047 2.471 0.420 0.047 0.296 196-1A(315F) 0.295 0.047 2.471 0.420 0.047 0.046 196-1A(315F) 0.295 0.046 1.359 196-1A(315F) 0.200 0.046 1.359 196-1A(315F) 0.200 0.046 1.359 196-1A(315F) 0.240 0.041 2.402 196-1A(400F) 0.245 0.046 2.010 196-1A(400F) 0.245 0.045 2.000		C.DI ACPTO	197-54/355	0 7 W	770	2 147	-		1 212	7
197-7A(1757) 0.220 0.045 1.225 0.296 0.296 0.265 1.257		7110011-7	130000000000							
197-7A(375F) 0.235 0.045 2.056 0.296 0.045 2.537 197-7A(375F) 0.215 0.045 1.011 0.306 0.045 2.625 197-6A(375F) 0.215 0.045 1.011 0.306 0.045 2.625 197-6A(375F) 0.205 0.045 1.794 0.275 0.045 2.406 197-10A(400F) 0.200 0.046 1.712 0.275 0.045 2.406 197-10A(400F) 0.200 0.046 1.712 0.275 0.045 2.406 197-10A(315F) 0.430 0.049 3.455 0.860 0.049 6.910 196-2A(315F) 0.410 0.040 3.428 1.250 0.049 0.045 1.050 196-3A(315F) 0.200 0.046 2.423 0.346 0.052 4.008 196-5A(375F) 0.200 0.046 1.306 1.759 196-5A(375F) 0.210 0.046 1.306 1.759 196-5A(375F) 0.240 0.046 2.010 1.759 196-5A(400F) 0.245 0.045 2.000 1.004 2.000 1.004 1.759 196-5A(400F) 0.245 0.045 2.000 1.004 1.006 1	COMPED		197-191)	0.770	C 10.0	1.925	6.273	CTE.	2.400	
197-6A(375F) 0.215 0.045 1.381 0.396 0.045 2.406 197-9A(400F) 0.205 0.045 1.794 0.275 0.045 2.406 197-10A(400F) 0.200 0.046 1.712 0.275 0.045 2.406 197-10A(400F) 0.200 0.046 1.712 0.275 0.046 2.406 444144414444444444444444444444444444			197-7A(375F)	0.235	6 .045	2.056	. 23	• • • • • • • • • • • • • • • • • • •	2.537	Ĭ.
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. JSA CAPON 198-2A(J1SF) 0.410 0.650 3.226 1.250 0.650 9.843 SANDED BEFORE 198-1A(J1SF) 0.295 0.047 2.471 0.620 0.407 6.869 LANTHALTION 198-AA(J1SF) 0.295 0.047 2.423 0.546 0.652 4.086 191 ' FIA.TIA' 198 6A(J1SF) 0.240 0.046 1.969 191 - AA(J1SF) 0.240 0.047 1.759 198 - AA(J1SF) 0.240 0.047 2.892 198 - BA(J1SF) 0.240 0.049 2.892 198 - BA(J0SF) 0.240 0.045 2.000 198 - BA(J0SF) 0.240 0.245 0.245 0.245	2 00	LOADING	196-1A(315F)	0.430	6.049	3.455	997.0	0.043	0.910	
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LANTMATTON 190-4A(3)3F) 0.320 0.052 2.423 0.546 0.052 4.008 191-5A(3)5F) 0.280 0.046 2.396 191-5A(3)5F) 0.210 0.046 1.969 191-7A(3)5F) 0.210 0.047 1.759 191-7A(3)7F) 0.240 0.049 2.892 191-9A(400F) 0.245 0.046 2.000		NED BEFORE	196 - 1A(335F)	0.295	0.047	2.471	0.120		6.169	177.966
191 - FLACTIC 198 - SA(195F) 0.280 0.046 2.396 191 - 74(195F) 0.210 0.046 1.969 198 - 84(195F) 0.210 0.047 1.759 198 - 84(195F) 0.245 0.049 2.092 198 - 94(400F) 0.245 0.048 2.000		THATTOR	196-45/11501	0 120	0.052	7.423		0.052	110.1	64,754
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STABILITY TESTING

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REVISED-

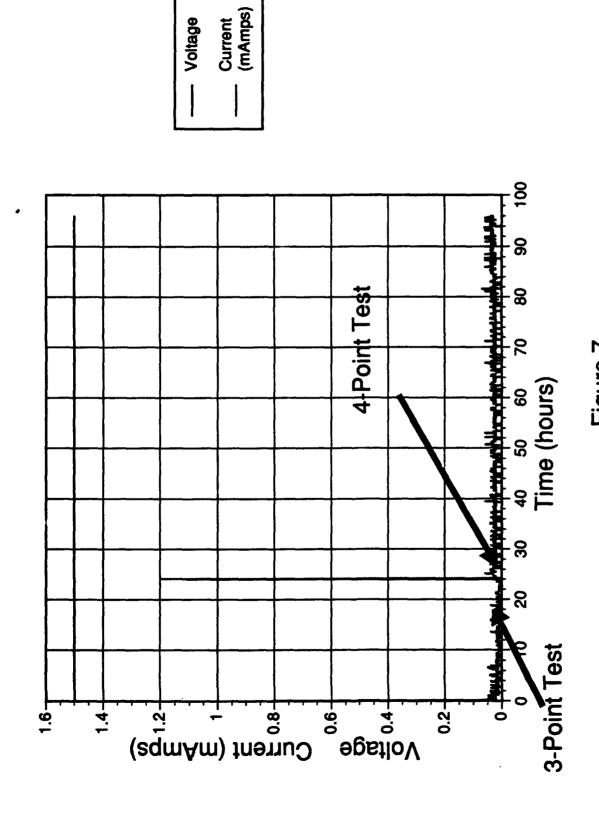


Figure 7
Sample 96a-1
0.050" Microthene 80% Loading
3.2% Resistivity Increase

Stability testing a bipolar substrate and/or conductive filler has been developed at JCBGI over many years. The method used for this contract is the 3 and 4 point tests were the bipolar substrate is exposed to a constant potential of 1.5 volts. The substrate is sandwiched between the two cells and serves as the working electrode. A constant potential of 1.5 volts is applied to the substrate. In the three electrode system were the current is collected at the top of the substrate. After 24 hours the test is switched to a four point test with the current being collected after it passes through the substrate. When the potential remaining at 1.5 volts, the test continues for a minimum of 3 additional days. Ideally, if the substrate was not porous, the current would remain the same for both the 3 and 4 point tests. A rising current during testing would suggest a porous substrate or a non-stable conductive filler.

The second test the substrate must pass is the conductivity test. The conductivity of the part is measured before and after the stability test. If the conductivity increases more than 20%, the accuracy of the conductivity test \pm 10-20%, the part has exhibited either porosity or the conductive filler is not stable. Since, Conduflow has been successfully tested, an increase in resistivity would indicate a porosity problem. The increase in resistance can be explained by the fact that the C-black side would be exposed to the positive potential by the porosity in the Conduflow part, which causes the C-black to oxidize and become non-conductive. In parts were the conductive filler is not stable the increase in resistivity is explained by the non-stability of the filler.

JCBGI's stability testing station consists of one four channel power supply which is controlled using a Macintosh computer and Labview software. The software was written by JCBGI and in conjunction with the computer makes the power supply act like a 4 channel potentiostats. The computer also the data collection device, recording voltage and current acceptance every 30 seconds.

6. BATTERY TEST RESULTS:

Four different four volt batteries have been tested. A summary of the test results and battery information can be found in Figure 8. The batteries are made using lead sheet terminal electrodes and one bipolar substrate. On the bipolar substrate 1g of Pb powder was sintered on to help promote paste adhesion. A number of pasting trials have been conducted and it was found that the PAM would not adhere to the bipolar substrate without some form of Pb adhered to the surface. Parts pasted without any Pb displayed no paste adhesion, the PAM would shear off at the substrate to PAM interface in sheet form.

Battery ID	% Filler	% <u>CA</u>	Thick	<u>Ω-cm</u>	PAM Weight	NAM Weight	Active Area
159	82.5	0.35	0.086"	1.83	34g	34g	12"
160	80.0	0.35	0.087"	3.14	34g	34g	12"

Battery terminals are lead sheets with 12g of active material on each. Separator thickness is 0.030", with the battery being assembled using gasket material and a glue to prohibit leaking. Less than 1g of lead dust was sintered on each bipolar plate to aid in paste adhesion. Acid was introduced via a vacuum fill technique. Formation took place over 48 hours with a total of 79 ah/# PAM (Positive Active Material). Battery 160 developed a short thorough the separator during formation. The separator was replaced and the formation was completed. Discharge data from .oth batteries follow.

Battery #159

				•		
Cycle	Date	<u>IR</u>	Dis I	D Time	% Recharge	Comments
1	3/25	40	10	41s	1120	
2	3/26	40	10	85s	1116	
3	3/29	43	20	31 s	643	
4	3/30	51	10	22s	256	Cold Crank
5	3/31	45	10	35s	243	
6	4/1	57	10	21s	1134	
7	4/2	61	10	53s	1103	
8	4/5	76	10	15s	2971	
9	4/6	76	10	65s	596	
10	4/7	88	10	69s	494	
11	4/8	95	10	70s	140	
12	4/9	105	10	24s	1100	
13	4/12	105	10	76s	140	
14	4/13	115	10	70s	140	
15	4/14	110	5	286s	140	
16	4/15	120	5	284s	140	
17	4/16	130	10	89s	140	
18	4/19	130	10	40s	140	
19	4/20	150	10	43s	200	
20	4/21	145	10	60s	200	
21	4/22	150	10	65s	200	
22	4/26	170	10	19s	200	
23	4/27	170	10	89s	200	
24	4/28	170	10	89s	200	
25	4/29	175	10	91s	200	
26	4/30	180	10	99s	300	

Figure 8: Battery Test Data

Battery #160

			Dis	Dis	%	
Cycle	Date	<u>IR</u>	Current	Time	Recharge	Comments
1	3/26	40	10	150s	553	
2	3/29	49	20	6 9 8	221	
3	3/30	56	10	109s	122	Cold Crank
4	3/31	56	10	123s	127	
5	4/1	80	20	148	530	
6	4/2	84	10	125s	193	
7	4/5	105	10	108s	167	
8	4/6	115	10	127s	133	
9	4/7	140	10	148s	133	
10	4/8	160	10	. 158s	. 140	
11	4/9	170	10	148s	200	
12	4/12	205	10	120s	140	
13	4/13	220	10	135s	140	
14	4/14	220	10	150s	125	
15	4/15	255	10	241s		

Teardown Performed on 4/16/93

Battery #159-B

			Dis	Dis	: %	
Cycle	<u>Date</u>	<u>IR</u>	Current	<u>Time</u>	Recharge	Comments
1	4/8	42	10	214s	271	
2	4/9	42/84	24	2s	388	Cold Crank
3	4/12	42	20	56s	140	
4	4/13	49	24	24s	140	
5.	4/14	49	10	67s	200	
6	4/15	55	5	224s	200	
7	4/16	56	10	113s	140	
8	4/19	65	10	57s	140	
9	4/20	72	10	39s	200	
10	4/21	67	10	39s	200	
11	4/22	80	10	38s	200	
12	4/26	96	10	9s		
13	4/27	72	10	132s	200	
14	4/28	74	10	97s	200	
15	4/29	76	10	83s	200	

Teardown Performed on 4/30/93

Figure 8 Cont.

Battery teardowns have determined that failure has been caused by lack of active material adhesion. The PAM would not be adhered to the substrate. This causes excessive resistance between the active material/substrate interface and severely hinders battery performance.

7. NEXT STEPS:

The three areas to be addressed in the remaining months of the contract are- Produce thinner more conductive substrates; Decide on a method to produce cell to cell sealing; Improve positive active material adhesion to the substrate. Of the three issues, the most critical is the adhesion issue. The first issue should, without any material improvements or breakthroughs, evolve simply from process optimization. The sealing issue is not seen as a major problem because of the material used as a base resin, PE, can be easily thermally bonded too. JCBGI has extensive experience in using vibration welding and infrared welding techniques to provide cell to cell sealing for bipolar batteries. These techniques can be easily modified for use in this project. The main development issue will be PAM adhesion to the substrate. Initial battery testing has shown that this has been the performance limiting area on all of the batteries made. Future development efforts will be concentrated on this area.